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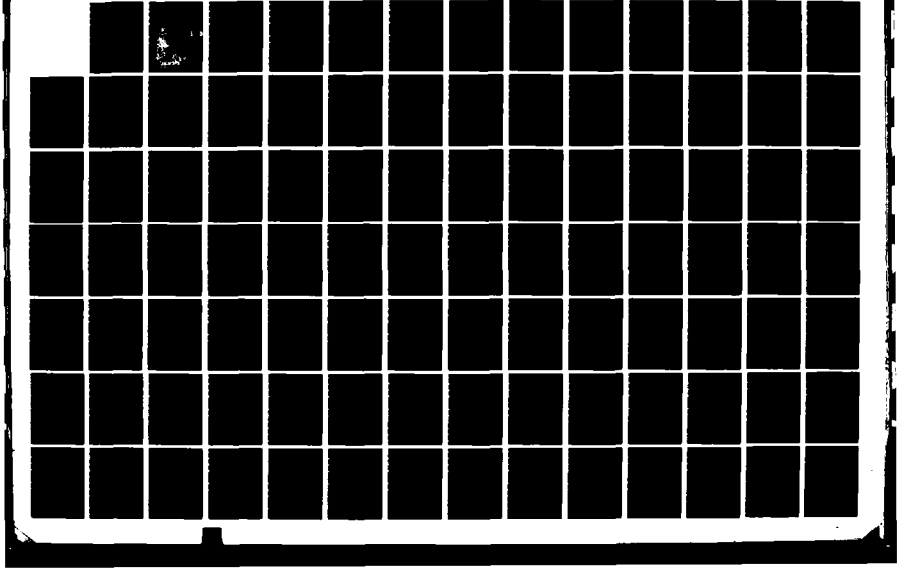

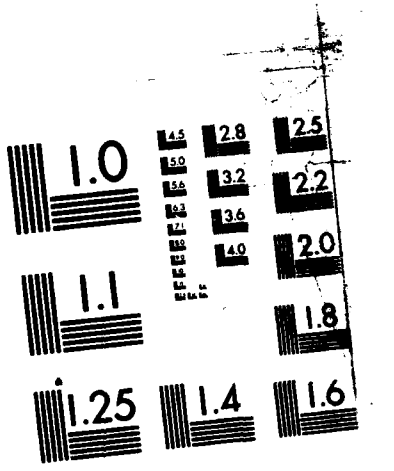

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RF LABORATORY

UE BENCH TEST PLANS AND REQUIREMENTS

VOLUME 2. ROCKWELL-COLLINS UE SET

N62269-82-D-0059

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UE BENCH TEST PLANS
AND REQUIREMENTS

VOLUME 2. ROCKWELL-COLLINS UE SET

SEPTEMBER 1984

CEA-RFL-84-005

Prepared for:

Naval Air Development Center

Warminster, PA 18974

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GPS UE BENCH TEST PLANS AND REQUIREMENTS

VOLUME 2

1.0 PURPOSE

The purpose of this report is to provide a basis for defining the hardware and software required to perform RF related bench tests of the Rockwell-Collins UE in the RF Laboratory of the GPS Central Engineering Activity at NAVAIRDEVCEN. For additional background information, see Volume 1.

1.1 SCOPE

This report contains general test requirements for each test defining the:

- level of test (UE, board, component),
- test objective (parameter/function),
- test inputs,
- tests outputs,
- equipment required for each input/output,
- initial test procedure,
- data reduction requirements,
- summary list of test equipment (standard/special),
- block diagram of test.

Since most of these tests will be computer controlled, special software will be required to control the conditions, parameters and data collection needs of the test.

A section on special software requirements is provided which defines the software needs of each test in terms of flowcharts.

2.0 LIST OF REFERENCE DOCUMENTS

The following documents were used as references for UE RF configuration and performance requirements:

1.	ICD-GPS-204	GPS Instrumentation and Connector Stds.	5 June 1981
2.	SS-US-200	System Segment Specification	4 Nov. 1982
3.	Collins	Engineering Drawings	23 Feb. 1982
4.	Collins	Design Review	15 March 1982
5.	Harris	GPS AE-1 LRU Performance Test Procedures	26 March 1982

3.0 TEST REQUIREMENTS

The test requirements contained herein deal with the Rockwell-Collins UE set and are written at the board level. Specific values of parameters, ranges, tolerances and granularities are provided if known. As more detailed information on the sets become available, missing values will be provided and the test requirements will be refined and expanded down to the component level.

3.1 ROCKWELL-COLLINS UE TEST REQUIREMENTS

This section contains the test requirements, procedures and block diagrams for board level testing of the Rockwell-Collins UE set. Initial functional test procedures have been compiled for the following boards or units:

1. Power Supply
2. RF Synthesizer
3. Correlator
4. IF Processor
5. Reference Oscillator
6. Antenna Electronics

Although information is available for these boards, there is not enough to completely identify board input and output levels for stimulation and measurement purposes. For example, some of the boards require digital input signals as stimuli. There is not enough information available to determine the required input levels for these signals or the levels for output signals. These digital signals also present a problem in that special purpose hardware may be required to interface the test equipment to the board being tested. This problem will be discussed further in Volume 3, Section 5.0 (Special Purpose Hardware Requirements).

No information has been located concerning Rockwell-Collins Preamplifier Unit. Test requirements for this unit will be provided as information becomes available.

3.1.1 Rockwell-Collins Test Procedures

The following sheets contain the initial test requirements and procedures as listed in Section 1.1 for each of the boards identified in Section 3.1. These sheets will be refined and expanded as more information becomes available. Also as more detailed data on the boards becomes available sheets will be added for testing to the component level.

3.1.1.1 POWER SUPPLY MODULE

Contractor: Rockwell-Collins

Board Tested: Power Supply

Test Objective: Measure DC output voltages.

Inputs

	Input Name	Input Level	Equipment Used
1.	AC or DC input	115V 400MHz(AC) or 160VDC	External Source
2.	(1/100) Fo	102,300Hz @ TBD	Function Generator (HP-8116A)
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			

Outputs

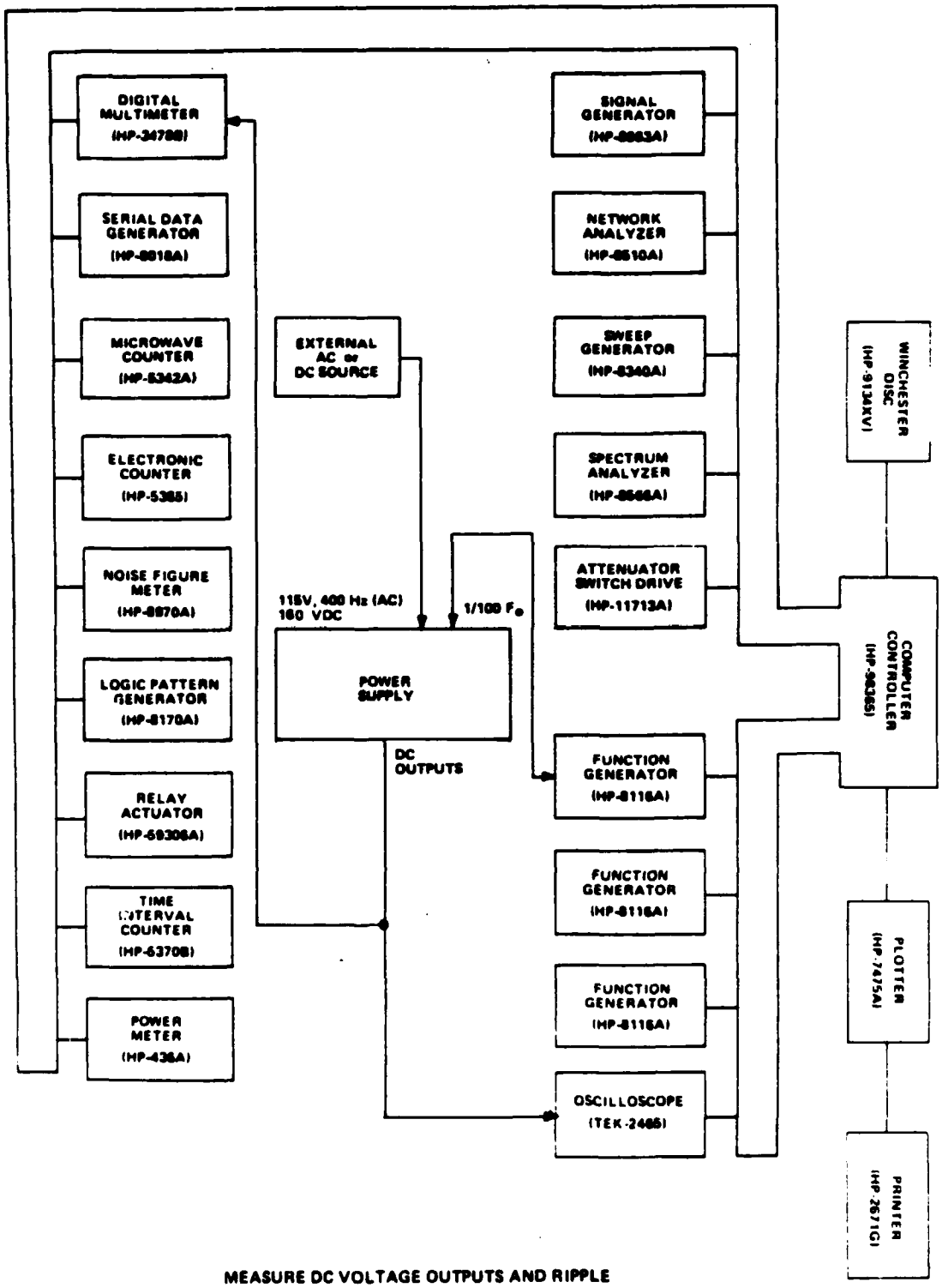
	Output Name	Output Level	Equipment Used
1.	DC output	+ 5 volts	Digital Multi (HP-3478B)
2.			Oscilloscope (TEK-2465)
3.			
4.			
5.			

Test Procedure: Turn on test equipment. Set measurement equipment proper ranges. Apply proper signal levels to all inputs. Measure DC voltage with Digital Multimeter. An Oscilloscope will be used to check for ripple. (This will be repeated for all DC outputs).

Data Reduction: Send input level and output of Digital Multimeter to printer. Output of Oscilloscope to plotter.

Equipment List:

1.	Computer (HP-9836S)	4.	Oscilloscope (TEK-2465)	7.	Plotter (HP-7475A)
2.	Digital Multi (HP-3478B)	5.	Function Gen. (HP-8116A)	8.	
3.	Printer (HP-2671G)	6.	External Source	9.	



MEASURE DC VOLTAGE OUTPUTS AND RIPPLE

Contractor: Rockwell-Collins

Board Tested: Power Supply

Test Objective: Verify Input Power Fault operational.

Inputs

	Input Name	Input Level	Equipment Used
1.	AC or DC input	115V, 400Hz(AC) or 160VDC	External Source
2.	(1/100) Fo	102,300Hz @ TBD	Function Generator (HP-8116A)
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			

Outputs

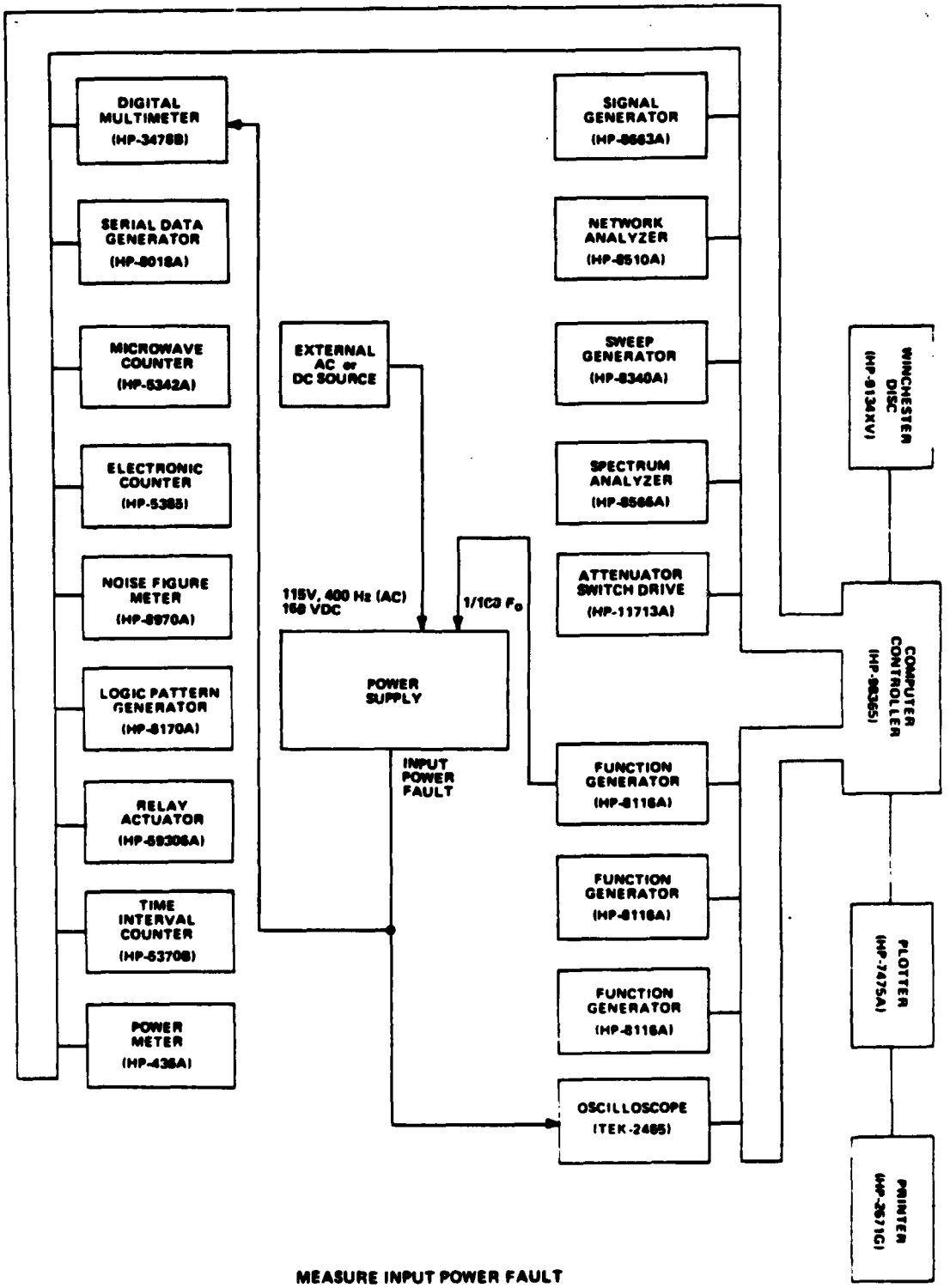
	Output Name	Output Level	Equipment Used
1.	Input Power Fault	TBD	Digital Multi. (HP-3478B)
2.			Oscilloscope (TEK-2465)
3.			
4.			
5.			

Test Procedure: Turn on test equipment. Set measurement equipment to proper ranges. Apply proper signal levels to all inputs. Measure Input Power Fault with Digital Multimeter. Then disconnect input power and measure Input Power Fault again with Digital Multimeter. An Oscilloscope will be used to display waveforms.

Data Reduction: Send input level and output of Digital Multimeter to printer. Output of Oscilloscope to plotter.

Equipment List:

1.	Computer (HP-9836S)	4.	Printer (HP-2671G)	7.	Plotter (HP-7475A)
2.	Function Gen. (HP-8116A)	5.	Oscilloscope (TEK-2465)	8.	
3.	Digital Multi. (HP-3478B)	6.	External Source	9.	



MEASURE INPUT POWER FAULT

Contractor: Rockwell-Collins

Board Tested: Power Supply

Test Objective: Verify Initiate Fault operational.

Inputs

	Input Name	Input Level	Equipment Used
1.	AC or DC input	115V, 400Hz(AC) or 160VDC	External Source
2.	(1/100) Fo	102,300Hz @ TBD	Function Generator (HP-8116A)
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			

Outputs

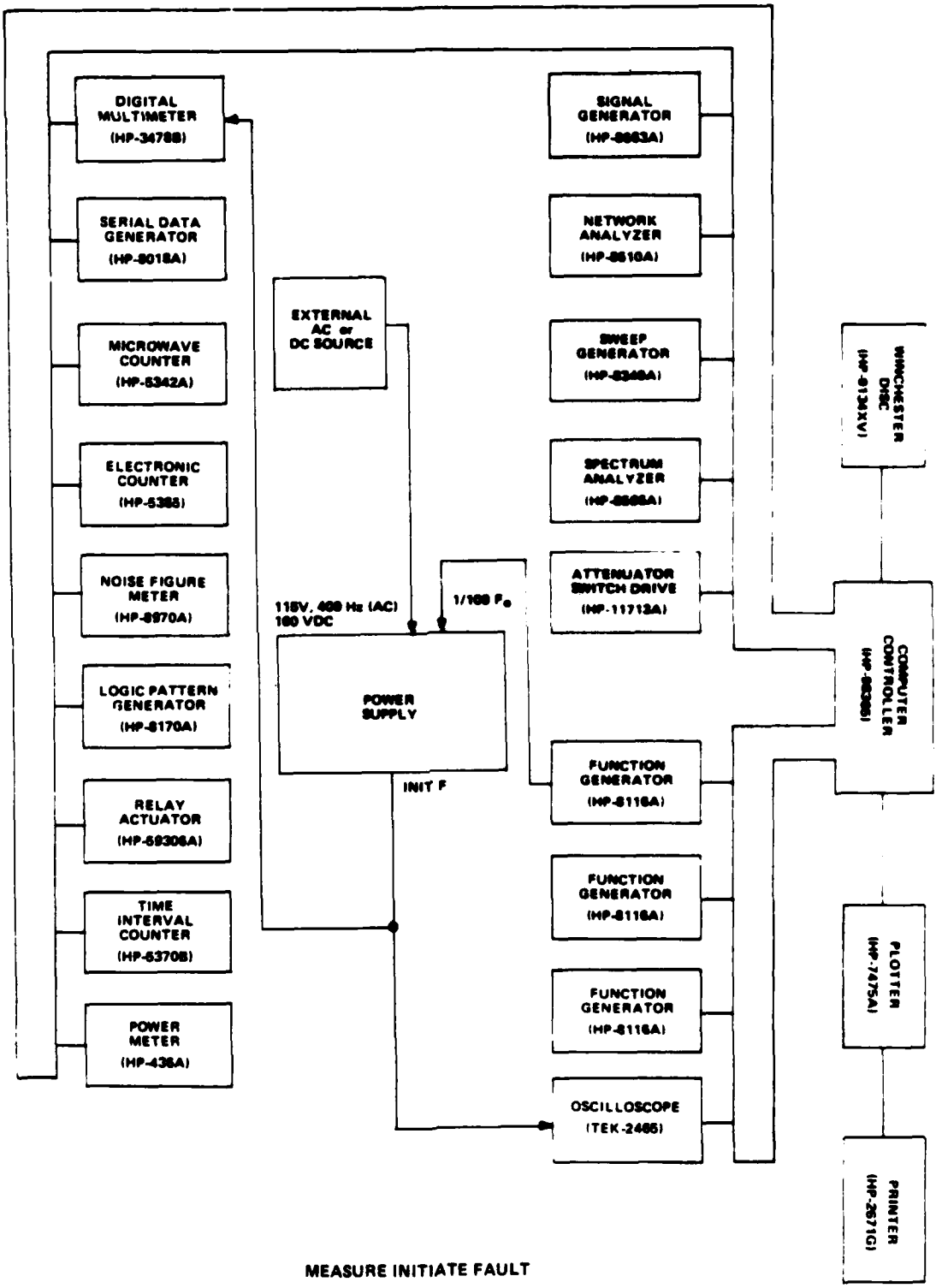
	Output Name	Output Level	Equipment Used
1.	Initiate Fault	TBD	Digital Multi (HP-3478B)
2.			Oscilloscope (TEK-2465)
3.			
4.			
5.			

Test Procedure: Turn on test equipment. Set measurement equipment to proper ranges. Apply proper signal levels to all inputs. Measure Initiate Fault output with Digital Multimeter. An Oscilloscope will be used to display waveform.

Data Reduction: Send input level and output of Digital Multimeter to printer. Output of Oscilloscope to plotter.

Equipment List:

1.	Computer (HP-9836S)	4.	Printer (HP-2671G)	7.	Plotter (HP-7475A)
2.	Function Gen. (HP-8116A)	5.	Oscilloscope (TEK-2465)	8.	
3.	Digital Multi. (HP-3478B)	6.	External Source	9.	



MEASURE INITIATE FAULT

Contractor: Rockwell-Collins

Board Tested: Power Supply

Test Objective: Verify receiver Power Supply Fault operational.

Inputs

	Input Name	Input Level	Equipment Used
1.	AC or DC input	115V, 400Hz(AC) or 160VDC	External Source
2.	(1/100) Fo	102,300Hz @ TBD	Function Generator (HP-8116A)
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			

Outputs

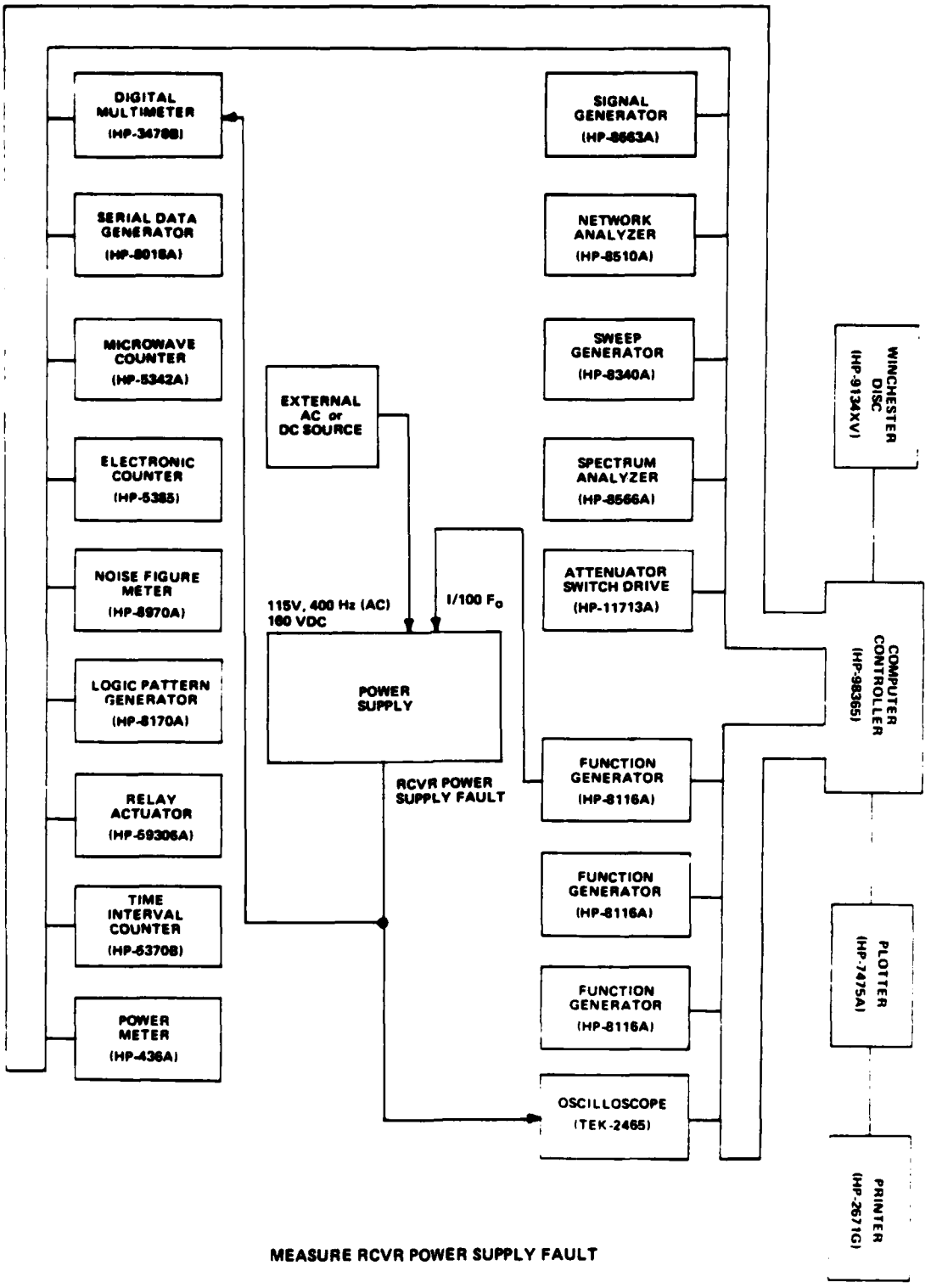
	Output Name	Output Level	Equipment Used
1.	Rcvr. Power Supply Fault	TBD	Digital Multi (HP-3478B)
2.			Oscilloscope (TEK-2465)
3.			
4.			
5.			

Test Procedure: Turn on test equipment. Set measurement equipment to proper ranges. Apply proper signal levels to all inputs. Measure Receiver Power Supply Fault with Digital Multimeter. An Oscilloscope will be used to display waveform.

Data Reduction: Send input level and output of Digital Multimeter to printer. Output of Oscilloscope to plotter.

Equipment List:

1.	Computer (HP-9836S)	4.	Printer (HP-2671G)	7.	Plotter (HP-7475A)
2.	Function Gen. (HP-8116A)	5.	Oscilloscope (TEK-2465)	8.	
3.	Digital Multi. (HP-3478B)	6.	External Source	9.	



MEASURE RCVR POWER SUPPLY FAULT

3.1.1.2 RF SYNTHESIZER MODULE

Contractor: Rockwell-Collins

Board Tested: RF Synthesizer

Test Objective: Verify proper operation of Control Signals output from synthesizer.

Inputs

	Input Name	Input Level	Equipment Used
1.	* Fo (3 inputs)	10.23MHz @ TBD	Signal Generator (HP-8663A)
2.	** Time Mark Enable	TBD	Log Patt. Gen. (HP-8170A)
3.	** Code Gen. Reset Strobe	TBD	Log Patt. Gen. (HP-8170A)
4.	** Init F	TBD	Log Patt. Gen. (HP-8170A)
5.	** BIT IF Control	TBD	Log Patt. Gen. (HP-8170A)
6.	** $^{137}/_{4}$ Fo Control	TBD	Log Patt. Gen. (HP-8170A)
7.			
8.			
9.			
10.			
11.			
12.			

* Power splitter needed to provide these 3 inputs.

** Breakout board needed to provide various levels for these 5 inputs.

Outputs

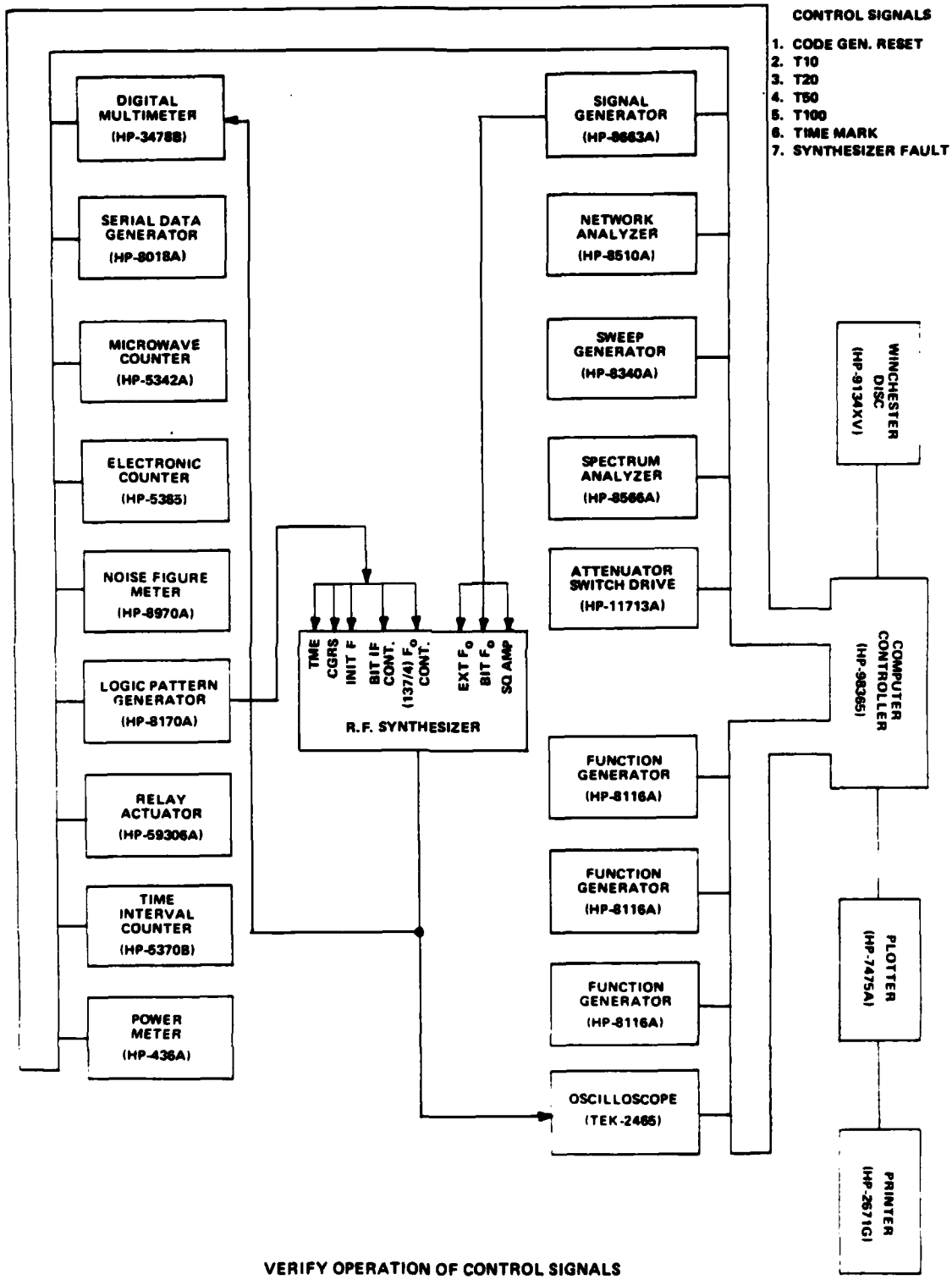
	Output Name	Output Level	Equipment Used
1.	Code Gen. Reset	TBD	DMM (HP-3478B)
2.	T10	TBD	Scope (TEK-2465)
3.	T20	TBD	
4.	T50	TBD	
5.	T100	TBD	
6.	Time Mark	TBD	
7.	Synthesizer Fault	TBD	

Test Procedure: Hook up unit test as shown in schematic. Turn on test equipment. Set measurement equipment to proper ranges. Apply proper signal levels to inputs of synthesizer board. Measure signal level of Control Signals with DMM. Observe signal presence and level with scope.

Data Reduction: Send input levels and output of Digital Multimeter to printer. Output of Oscilloscope to plotter.

Equipment List:

1.	Sig. Gen. (HP-8663A)	4.	Printer (HP-2671G)	7.	Plotter (HP-7475A)
2.	Log Patt. Gen. (HP-8170A)	5.	DMM (HP-3478B)	8.	
3.	Computer (HP-9836S)	6.	Scope (TEK-2465)	9.	



VERIFY OPERATION OF CONTROL SIGNALS

Contractor: Rockwell-Collins

Board Tested: RF Synthesizer

Test Objective: Verify proper frequency output from BIT Fo output of synthesizer.

Inputs

	Input Name	Input Level	Equipment Used
1.	* Fo (3 inputs)	10.23MHz @ TBD	Signal Generator (HP-8663A)
2.	** Time Mark Enable	TBD	Log Patt. Gen. (HP-8170A)
3.	** Code Gen. Reset Strobe	TBD	Log Patt. Gen. (HP-8170A)
4.	** Init F	TBD	Log Patt. Gen. (HP-8170A)
5.	** BIT IF Control	TBD	Log Patt. Gen. (HP-8170A)
6.	** $^{137}/_{4}$ Fo Control	TBD	Log Patt. Gen. (HP-8170A)
7.			
8.			
9.			
10.			
11.			
12.			

* Power splitter needed to provide these 3 inputs.

** Breakout board needed to provide various levels for these 5 inputs.

Outputs

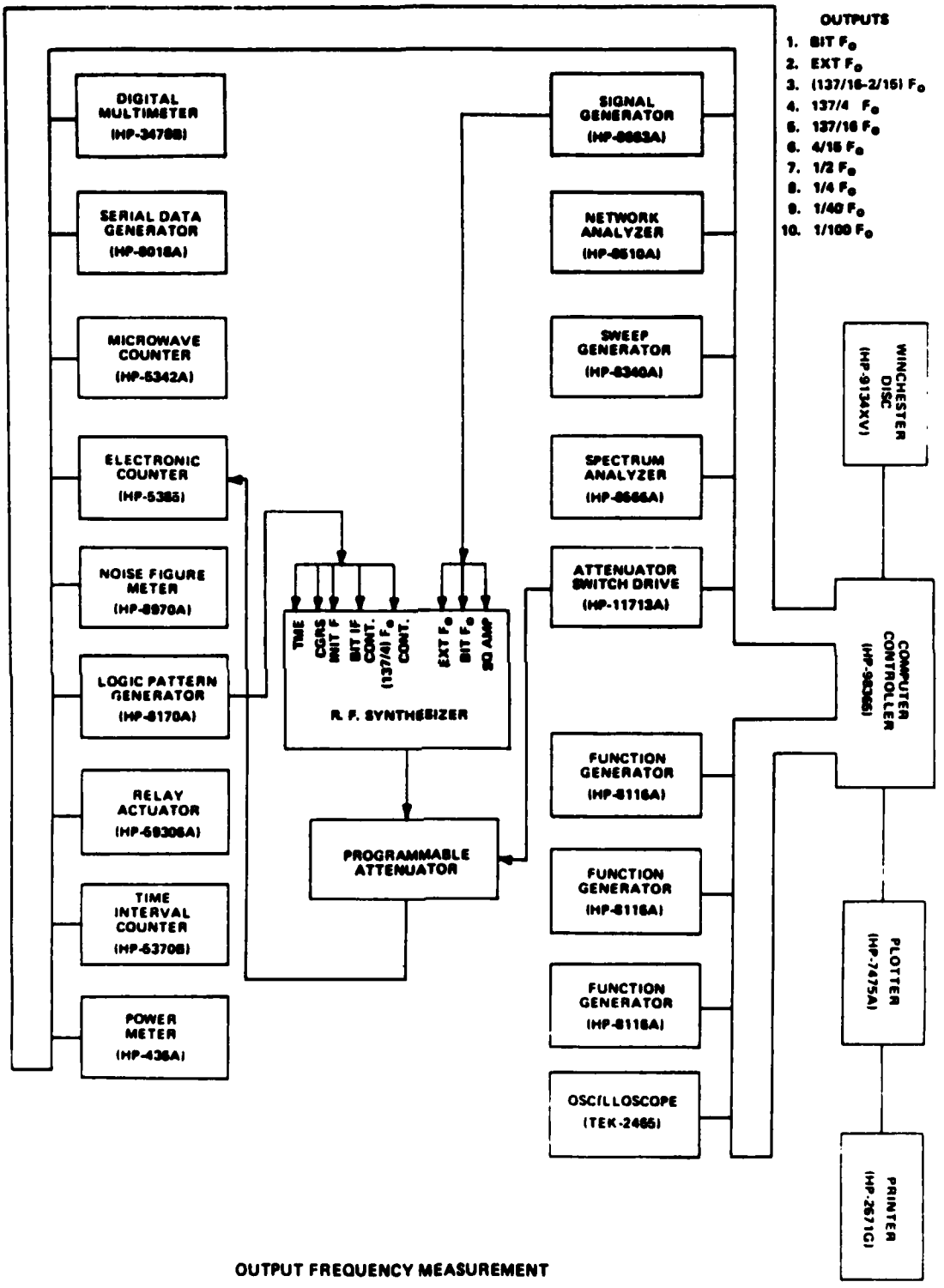
	Output Name	Output Level	Equipment Used
1.	BIT Fo	10.23MHz	Elec. Counter (HP-5385)
2.			Prog. Atten. (HP-8494G)
3.			Att Sw Drive (HP-11713A)
4.			
5.			

Test Procedure: Hook up unit under test as shown in schematic. Turn on test equipment. Set measurement equipment to proper ranges. Apply proper signal levels to inputs of synthesizer board. Measure output frequency with Electronic Counter.

Data Reduction: Send input levels and output of Electronic Counter to printer.

Equipment List:

1.	Sig. Gen. (HP-8663A)	4.	Printer (HP-2671G)	7.	Atten. Sw Dr. (HP-11713A)
2.	Log Patt Gen (HP-8170A)	5.	Elec. Ctr. (HP-5385)	8.	
3.	Computer (HP-9836S)	6.	Prog. Atten. (HP-8494G)	9.	



OUTPUT FREQUENCY MEASUREMENT

Contractor: Rockwell-Collins

Board Tested: RF Synthesizer

Test Objective: Verify proper frequency output from Ext Fo output of synthesizer.

Inputs

	Input Name	Input Level	Equipment Used
1.	* Fo (3 inputs)	10.23MHz @ TBD	Signal Gen. (HP-8663A)
2.	** Time Mark Enable	TBD	Log Patt. Gen. (HP-8170A)
3.	** Code Gen. Reset Strobe	TBD	Log Patt. Gen. (HP-8170A)
4.	** Init F	TBD	Log Patt. Gen. (HP-8170A)
5.	** BIT IF Control	TBD	Log Patt. Gen. (HP-8170A)
6.	** $137/_4$ Fo Control	TBD	Log Patt. Gen. (HP-8170A)
7.			
8.			
9.			
10.			
11.			
12.			

* Power splitter needed to provide these 3 inputs.

** Breakout board needed to provide various levels for these 5 inputs.

Outputs

	Output Name	Output Level	Equipment Used
1.	Ext Fo	10.23MHz	Elec Counter (HP-5385)
2.			Prog. Atten (HP-8494G)
3.			Att. Sw. Drive (HP-11713A)
4.			
5.			

Test Procedure: Hook up unit under test as shown in schematic. Turn on test equipment. Set measurement equipment to proper ranges. Apply proper signal levels to inputs of synthesizer board. Measure output frequency with Electronic Counter.

Data Reduction: Send input levels and output of Electronic Counter to printer.

Equipment List:

1.	Signal Gen. (HP-8663A)	4.	Printer (HP-2671G)	7.	Att Sw Drive (HP-11713A)
2.	Log Patt Gen (HP-8170A)	5.	Elec Counter (HP-5385)	8.	
3.	Computer (HP-9836S)	6.	Prog Atten. (HP-8494G)	9.	

Contractor: Rockwell-Collins

Board Tested: RF Synthesizer

Test Objective: Verify proper frequency from ($^{137}/_{16}$ - $^{2}/_{15}$) Fo output of synthesizer.

Inputs

	Input Name	Input Level	Equipment Used
1.	* Fo (3 inputs)	10.23MHz @ TBD	Signal Gen. (HP-8663A)
2.	** Time Mark Enable	TBD	Log Patt. Gen. (HP-8170A)
3.	** Code Gen. Reset Strobe	TBD	Log Patt. Gen. (HP-8170A)
4.	** Init F	TBD	Log Patt. Gen. (HP-8170A)
5.	** BIT IF Control	TBD	Log Patt. Gen. (HP-8170A)
6.	** $^{137}/_{4}$ Fo Control	TBD	Log Patt. Gen. (HP-8170A)
7.			
8.			
9.			
10.			
11.			
12.			

* Power splitter needed to provide these 3 inputs.

** Breakout board needed to provide various levels for these 5 inputs.

Outputs

	Output Name	Output Level	Equipment Used
1.	$(^{137}/_{16} - {}^{2}/_{15})$ Fo	86.230375MHz	Elec Counter (HP-5385)
2.			Prog. Atten (HP-8494G)
3.			Att. Sw Drive (HP-11713A)
4.			
5.			

Test Procedure: Hook up unit under test as shown in schematic. Turn on test equipment. Set measurement equipment to proper ranges. Apply proper signal levels to inputs of synthesizer board. Measure $(^{137}/_{16} - {}^{2}/_{15})$ Fo frequency with Electronic Counter.

Data Reduction: Send input levels and output of Electronic Counter to printer.

Equipment List:

1.	Sig. Gen. (HP-8663A)	4.	Printer (HP-2671G)	7.	Att Sw Drive (HP-11713A)
2.	Log Patt Gen (HP-8170A)	5.	Elec Counter (HP-5385)	8.	
3.	Computer (HP-9836S)	6.	Prog Atten. (HP-8494G)	9.	

Contractor: Rockwell-Collins

Board Tested: RF Synthesizer

Test Objective: Verify proper frequency output of ($^{137}/_{4}$) Fo synthesizer output.

Inputs

	Input Name	Input Level	Equipment Used
1.	* Fo (3 inputs)	10.23MHz @ TBD	Signal Gen. (HP-8663A)
2.	** Time Mark Enable	TBD	Log Patt. Gen. (HP-8170A)
3.	** Code Gen. Reset Strobe	TBD	Log Patt. Gen. (HP-8170A)
4.	** Init F	TBD	Log Patt. Gen. (HP-8170A)
5.	** BIT IF Control	TBD	Log Patt. Gen. (HP-8170A)
6.	** $^{137}/_{4}$ Fo Control	TBD	Log Patt. Gen. (HP-8170A)
7.			
8.			
9.			
10.			
11.			
12.			

* Power splitter needed to provide these 3 inputs.

** Breakout board needed to provide various levels for these 5 inputs.

Outputs

	Output Name	Output Level	Equipment Used
1.	$(^{137}/_{4})$ Fo	350.3775MHz	Elec Counter (HP-5385)
2.			Prog. Atten. (HP-8494G)
3.			Att Sw Drive (HP-11713A)
4.			
5.			

Test Procedure: Hook up unit under test as shown in schematic. Turn on test equipment. Set measurement equipment to proper ranges. Apply proper signal levels to inputs of synthesizer board. Measure $(^{137}/_{4})$ Fo frequency with Electronic Counter.

Data Reduction: Send input levels and output of Electronic Counter to printer.

Equipment List:

1.	Signal Gen. (HP-8663A)	4.	Printer (HP-2671G)	7.	Att Sw Drive (HP-11713A)
2.	Log Patt Gen (HP-8170A)	5.	Elec Counter (HP-5385)	8.	
3.	Computer (HP-9836S)	6.	Prog Atten. (HP-8494G)	9.	

Contractor: Rockwell-Collins

Board Tested: RF Synthesizer

Test Objective: Verify proper output frequency from synthesizer ($^{137}/_{16}$) Fo output.

Inputs

	Input Name	Input Level	Equipment Used
1.	* Fo (3 inputs)	10.23MHz @ TBD	Signal Gen. (HP-8663A)
2.	** Time Mark Enable	TBD	Log Patt. Gen. (HP-8170A)
3.	** Code Gen. Reset Strobe	TBD	Log Patt. Gen. (HP-8170A)
4.	** Init F	TBD	Log Patt. Gen. (HP-8170A)
5.	** BIT IF Control	TBD	Log Patt. Gen. (HP-8170A)
6.	** $^{137}/_{4}$ Fo Control	TBD	Log Patt. Gen. (HP-8170A)
7.			
8.			
9.			
10.			
11.			
12.			

* Power splitter needed to provide these 3 inputs.

** Breakout board needed to provide various levels for thes 5 inputs.

Outputs

	Output Name	Output Level	Equipment Used
1.	$(^{137}/_{16})Fo$	87.594375MHz	Elec Counter (HP-5385)
2.			Prog. Atten. (HP-8494G)
3.			Att Sw Drive (HP-11713A)
4.			
5.			

Test Procedure: Hook up unit under test as shown in schematic. Turn on test equipment. Set measurement equipment to proper ranges. Apply proper signal levels to inputs of synthesizer board. Measure $(^{137}/_{16})Fo$ frequency with Electronic Counter.

Data Reduction: Send input levels and output of Electronic Counter to printer.

Equipment List:

1.	Signal Gen. (HP-8663A)	4.	Printer (HP-2671G)	7.	Att Sw Drive (HP-11713A)
2.	Log Patt Gen. (HP-8170A)	5.	Elec Counter (HP-5385)	8.	
3.	Computer (HP-9836S)	6.	Prog. Atten. (HP-8494G)	9.	

Contractor: Rockwell-Collins

Board Tested: RF Synthesizer

Test Objective: Verify proper output frequency from synthesizer ($^{4}/_{15}$)Fo output.

Inputs

	Input Name	Input Level	Equipment Used
1.	* Fo (3 inputs)	10.23MHz @ TBD	Signal Gen. (HP-8663A)
2.	** Time Mark Enable	TBD	Log Patt. Gen. (HP-8170A)
3.	** Code Gen. Reset Strobe	TBD	Log Patt. Gen. (HP-8170A)
4.	** Init F	TBD	Log Patt. Gen. (HP-8170A)
5.	** BIT IF Control	TBD	Log Patt. Gen. (HP-8170A)
6.	** $^{137}/_{4}$ Fo Control	TBD	Log Patt. Gen. (HP-8170A)
7.			
8.			
9.			
10.			
11.			
12.			

* Power splitter needed to provide these 3 inputs.

** Breakout board needed to provide various levels for these 5 inputs.

Outputs

	Output Name	Output Level	Equipment Used
1.	$(^4/_{15})$ Fo	2.728MHz	Elec Counter (HP-5385)
2.			Prog. Atten. (HP-8494G)
3.			Att. Sw Dr. (HP-11713A)
4.			
5.			

Test Procedure: Hook up unit under test as shown in schematic. Turn on test equipment. Set measurement equipment to proper ranges. Apply proper signal levels to inputs of synthesizer board. Measure the frequency of the $(^4/_{15})$ Fo output signal with the Electronic Counter. Repeat this measurement for the following outputs.

$\frac{1}{2}$Fo	1/40 Fo
$\frac{1}{4}$Fo	1/100 Fo

Data Reduction: Send input levels and output of Electronic Counter to printer.

Equipment List:

1.	Signal Gen. (HP-8663A)	4.	Printer (HP-2671G)	7.	Att. Sw Drive (HP-11713A)
2.	Log Patt. Gen. (HP-8170A)	5.	Elec Counter (HP-5385)	8.	
3.	Computer (HP-9836S)	6.	Prog. Attn (HP-8494G)	9.	

Contractor: Rockwell-Collins

Board Tested: RF Synthesizer

Test Objective: Verify proper power level for BIT Fo signal from synthesizer.

Inputs

	Input Name	Input Level	Equipment Used
1.	* Fo (3 inputs)	10.23MHz @ TBD	Signal Gen. (HP-8663A)
2.	** Time Mark Enable	TBD	Log Patt. Gen. (HP-8170A)
3.	** Code Gen. Reset Strobe	TBD	Log Patt. Gen. (HP-8170A)
4.	** Init F	TBD	Log Patt. Gen. (HP-8170A)
5.	** BIT IF Control	TBD	Log Patt. Gen. (HP-8170A)
6.	** $^{137}/_{4}$ Fo Control	TBD	Log Patt. Gen. (HP-8170A)
7.			
8.			
9.			
10.			
11.			
12.			

* Power splitter needed to provide these 3 inputs.

** Breakout board needed to provide various levels for these 5 inputs.

Outputs

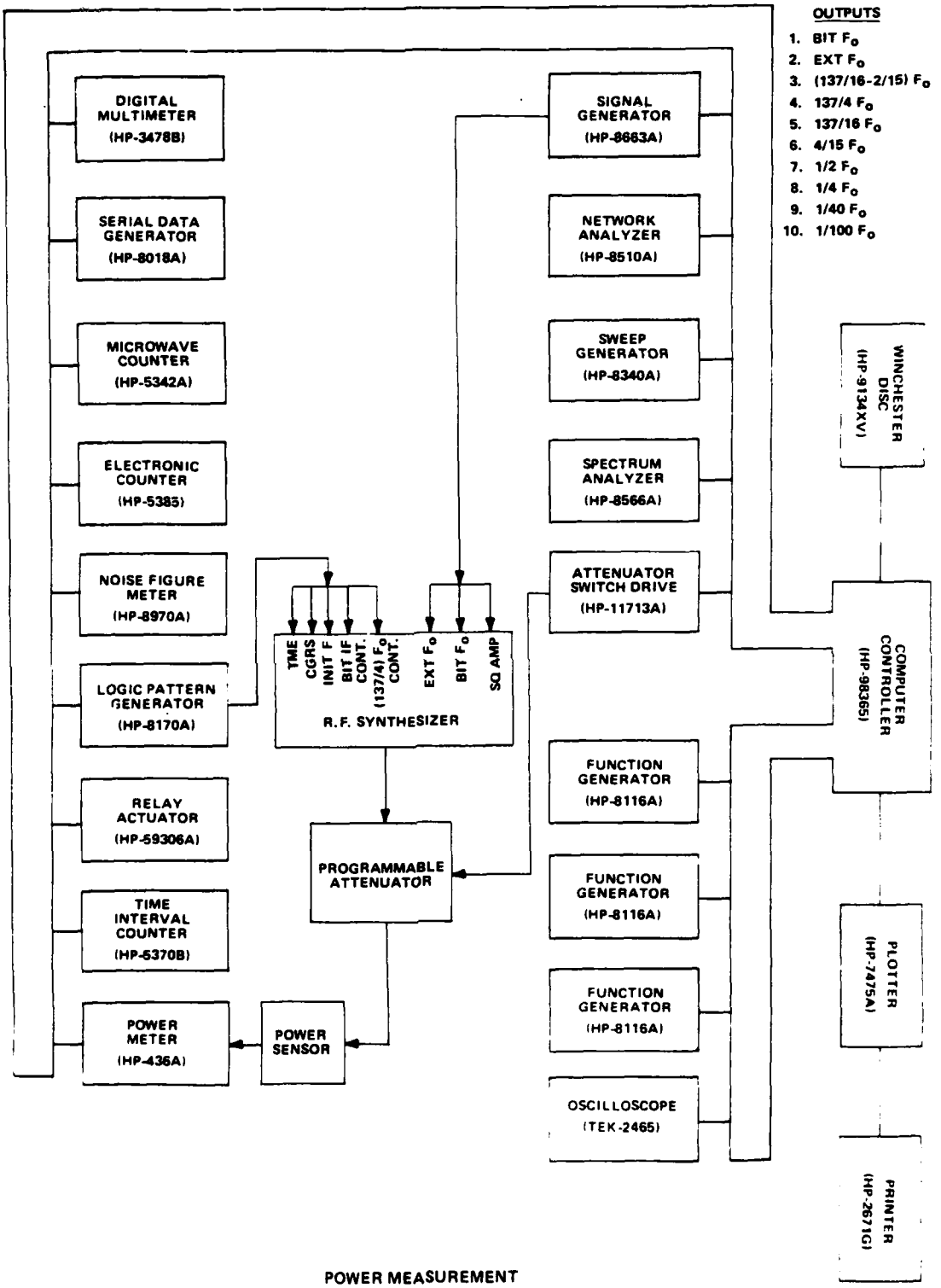
	Output Name	Output Level	Equipment Used
1.	BIT Fo	TBD	Power Meter (HP-436A)
2.			Power Sensor (HP-8481A)
3.			Prog. Atten. (HP-8494G)
4.			Att. Sw Drive (HP-11713A)
5.			

Test Procedure: Hook up unit under test as shown in schematic. Turn on test equipment. Set measurement equipment to proper ranges. Apply proper signal levels to inputs of synthesizer board. Measure the power level of the BIT Fo output signal with the Power Meter.

Data Reduction: Send input levels and output of Power Meter to printer.

Equipment List:

1.	Sig. Gen. (HP-8663A)	4.	Printer (HP-2671G)	7.	Prog. Atten. (HP-8494G)
2.	Log Patt Gen. (HP-8170A)	5.	Power Meter (HP-436A)	8.	Att Sw Drive (HP-11713A)
3.	Computer (HP-9836S)	6.	Power Sensor (HP-8481A)	9.	



POWER MEASUREMENT

Contractor: Rockwell-Collins

Board Tested: RF Synthesizer

Test Objective: Verify proper power level for Ext Fo signal from Synthesizer.

Inputs

	Input Name	Input Level	Equipment Used
1.	* Fo (3 inputs)	10.23MHz @ TBD	Signal Gen. (HP-8663A)
2.	** Time Mark Enable	TBD	Log Patt. Gen. (HP-8170A)
3.	** Code Gen. Reset Strobe	TBD	Log Patt. Gen. (HP-8170A)
4.	** Init F	TBD	Log Patt. Gen. (HP-8170A)
5.	** BIT IF Control	TBD	Log Patt. Gen. (HP-8170A)
6.	** $^{137}/_{4}$ Fo Control	TBD	Log Patt. Gen. (HP-8170A)
7.			
8.			
9.			
10.			
11.			
12.			

* Power splitter needed to provide these 3 inputs.

** Breakout board needed to provide various levels for these 5 inputs.

Outputs

	Output Name	Output Level	Equipment Used
1.	Ext Fo	TBD	Power Meter (HP-436A)
2.			Power Sensor (HP-8481A)
3.			Prog. Atten. (HP-8494G)
4.			Att. Sw Dr. (HP-11713A)
5.			

Test Procedure: Hook up unit under test as shown in schematic. Turn on test equipment. Set measurement equipment to proper ranges. Apply proper signal levels to inputs of synthesizer board. Measure the power level of the output signal with the Power Meter.

Data Reduction: Send input levels and output of Power Meter to printer.

Equipment List:

1.	Sig. Gen. (HP-8663A)	4.	Printer (HP-2671G)	7.	Prog. Atten. (HP-8494G)
2.	Log Patt Gen (HP-8170A)	5.	Power Meter (HP-436A)	8.	Att. Sw Dr. (HP-11713A)
3.	Computer (HP-9836S)	6.	Power Sensor (HP-8481A)	9.	

Contractor: Rockwell-Collins

Board Tested: RF Synthesizer

Test Objective: Verify proper power level for [$^{137}/_{16}$ - $^{2}/_{15}$] Fo signal from synthesizer.

Inputs

	Input Name	Input Level	Equipment Used
1.	* Fo (3 inputs)	10.23MHz @ TBD	Signal Gen. (HP-8663A)
2.	** Time Mark Enable	TBD	Log Patt. Gen. (HP-8170A)
3.	** Code Gen. Reset Strobe	TBD	Log Patt. Gen. (HP-8170A)
4.	** Init F	TBD	Log Patt. Gen. (HP-8170A)
5.	** BIT IF Control	TBD	Log Patt. Gen. (HP-8170A)
6.	** $^{137}/_{4}$ Fo Control	TBD	Log Patt. Gen. (HP-8170A)
7.			
8.			
9.			
10.			
11.			
12.			

* Power splitter needed to provide these 3 inputs.

** Breakout board needed to provide various levels for these 5 inputs.

Outputs

	Output Name	Output Level	Equipment Used
1.	$(^{137}/_{16} - {}^{2}/_{15})$ Fo	TBD	Power Meter (HP-436A)
2.			Power Sensor (HP-8481A)
3.			Prog. Atten. (HP-8494G)
4.			Att. Sw Drive (HP-11713A)
5.			

Test Procedure: Hook up unit under test as shown in schematic. Turn on test equipment. Set measurement equipment to proper ranges. Apply proper signal levels to inputs of synthesizer board. Measure the power level of the $(^{137}/_{16} - {}^{2}/_{15})F_o$ output signal with the Power Meter.

Data Reduction: Send input levels and output of Power Meter to printer.

Equipment List:

1.	Signal Gen. (HP-8663A)	4.	Printer (HP-2671G)	7.	Prog. Atten. (HP-8494G)
2.	Log Patt Gen (HP-8170A)	5.	Power Meter (HP-436A)	8.	Att. Sw Drive (HP-11713A)
3.	Computer (HP-9836S)	6.	Power Sensor (HP-8481A)	9.	

Contractor: Rockwell-Collins

Board Tested: RF Synthesizer

Test Objective: Verify proper power level for ($^{137}/_{16}$)Fo signal from synthesizer.

Inputs

	Input Name	Input Level	Equipment Used
1.	* Fo (3 inputs)	10.23MHz @ TBD	Signal Gen. (HP-8663A)
2.	** Time Mark Enable	TBD	Log Patt. Gen. (HP-8170A)
3.	** Code Gen. Reset Strobe	TBD	Log Patt. Gen. (HP-8170A)
4.	** Init F	TBD	Log Patt. Gen. (HP-8170A)
5.	** BIT IF Control	TBD	Log Patt. Gen. (HP-8170A)
6.	** $^{137}/_{4}$ Fo Control	TBD	Log Patt. Gen. (HP-8170A)
7.			
8.			
9.			
10.			
11.			
12.			

* Power splitter needed to provide these 3 inputs.

** Breakout board needed to provide various levels for these 5 inputs.

Outputs

	Output Name	Output Level	Equipment Used
1.	$^{137}/_{16}$ Fo	TBD	Power Meter (HP-436A)
2.			Power Sensor (HP-8481A)
3.			Prog. Atten. (HP-8494G)
4.			Att Sw Drive (HP-11713A)
5.			

Test Procedure: Hook up unit under test as shown in schematic. Turn on test equipment. Set measurement equipment to proper ranges. Apply proper signal levels to inputs of synthesizer board. Measure the power level of the ($^{137}/_{16}$)Fo output signal with the Power Meter.

Data Reduction: Send input levels and output of Power Meter to printer.

Equipment List:

1.	Signal Gen. (HP-8663A)	4.	Printer (HP-2671G)	7.	Prog. Atten. (HP-8494G)
2.	Log Patt Gen (HP-8170A)	5.	Power Meter (HP-436A)	8.	Att Sw Drive (HP-11713A)
3.	Computer (HP-9836S)	6.	Power Sensor (HP-8481A)	9.	

Contractor: Rockwell-Collins

Board Tested: RF Synthesizer

Test Objective: Verify proper power level for ($^{137}/_{4}$)Fo signal from synthesizer.

Inputs

	Input Name	Input Level	Equipment Used
1.	* Fo (3 inputs)	10.23MHz @ TBD	Signal Gen. (HP-8663A)
2.	** Time Mark Enable	TBD	Log Patt. Gen. (HP-8170A)
3.	** Code Gen. Reset Strobe	TBD	Log Patt. Gen. (HP-8170A)
4.	** Init F	TBD	Log Patt. Gen. (HP-8170A)
5.	** BIT IF Control	TBD	Log Patt. Gen. (HP-8170A)
6.	** $^{137}/_{4}$ Fo Control	TBD	Log Patt. Gen. (HP-8170A)
7.			
8.			
9.			
10.			
11.			
12.			

* Power splitter needed to provide these 3 inputs.

** Breakout board needed to provide various levels for thes 5 inputs.

Outputs

	Output Name	Output Level	Equipment Used
1.	$(^{137}/_{4})$Fo	TBD	Power Meter (HP-436A)
2.			Power Sensor (HP-8481A)
3.			Prog. Atten. (HP-8494G)
4.			Att Sw Drive (HP-11713A)
5.			

Test Procedure: Hook up unit under test as shown in schematic. Turn on test equipment. Set measurement equipment to proper ranges. Apply proper signal levels to inputs of synthesizer board. Measure the power level of the $(^{137}/_{4})$Fo output signal with the Power Meter.

Data Reduction: Send input levels and output of Power Meter to printer.

Equipment List:

1.	Sig. Gen. (HP-8663A)	4.	Printer (HP-2671G)	7.	Prog. Atten. (HP-8494G)
2.	Log Patt Gen (HP-8170A)	5.	Power Meter (HP-436A)	8.	Att. Sw Drive (HP-11713A)
3.	Computer (HP-9836S)	6.	Power Sensor (HP-8481A)	9.	

Contractor: Rockwell-Collins

Board Tested: RF Synthesizer

Test Objective: Verify proper power level (4/15)Fo output signal from synthesizer.

Inputs

	Input Name	Input Level	Equipment Used
1.	* Fo (3 inputs)	10.23MHz @ TBD	Signal Gen. (HP-8663A)
2.	** Time Mark Enable	TBD	Log Patt. Gen. (HP-8170A)
3.	** Code Gen. Reset Strobe	TBD	Log Patt. Gen. (HP-8170A)
4.	** Init F	TBD	Log Patt. Gen. (HP-8170A)
5.	** BIT IF Control	TBD	Log Patt. Gen. (HP-8170A)
6.	** 137/4 Fo Control	TBD	Log Patt. Gen. (HP-8170A)
7.			
8.			
9.			
10.			
11.			
12.			

* Power splitter needed to provide these 3 inputs.

** Breakout board needed to provide various levels for these 5 inputs.

Outputs

	Output Name	Output Level	Equipment Used
1.	(4/15) Fo	TBD	Power Meter (HP-436A)
2.			Power Sensor (HP-8481A)
3.			Prog. Atten. (HP-8494G)
4.			Att Sw Drive (HP-11713A)
5.			

Test Procedure: Hook up unit under test as shown in schematic. Turn on test equipment. Set measurement equipment to proper ranges. Apply proper signal levels to inputs of synthesizer board. Measure the power level of the (4/15)Fo output signal with the Power Meter. Repeat this measurement for the following output:

$\frac{1}{2}$Fo	$\frac{1}{40}$Fo
$\frac{1}{4}$Fo	$\frac{1}{100}$Fo

Data Reduction: Send input levels and output of Power Meter to printer.

Equipment List:

1.	Signal Gen. (HP-8663A)	4.	Printer (HP-2671G)	7.	Prog. Atten. (HP-8494G)
2.	Log Patt Gen (HP-8170A)	5.	Power Meter (HP-436A)	8.	Att. Sw Drive (HP-11713A)
3.	Computer (HP-9836S)	6.	Power Sensor (HP-8481A)	9.	

Contractor: Rockwell-Collins

Board Tested: RF Synthesizer

Test Objective: Verify proper spectral content of synthesizer Ext Fo output.

Inputs

	Input Name	Input Level	Equipment Used
1.	* Fo (3 inputs)	10.23MHz @ TBD	Signal Gen. (HP-8663A)
2.	** Time Mark Enable	TBD	Log Patt. Gen. (HP-8170A)
3.	** Code Gen. Reset Strobe	TBD	Log Patt. Gen. (HP-8170A)
4.	** Init F	TBD	Log Patt. Gen. (HP-8170A)
5.	** BIT IF Control	TBD	Log Patt. Gen. (HP-8170A)
6.	** 137/4 Fo Control	TBD	Log Patt. Gen. (HP-8170A)
7.			
8.			
9.			
10.			
11.			
12.			

* Power splitter needed to provide these 3 inputs.

** Breakout board needed to provide various levels for these 5 inputs.

Outputs

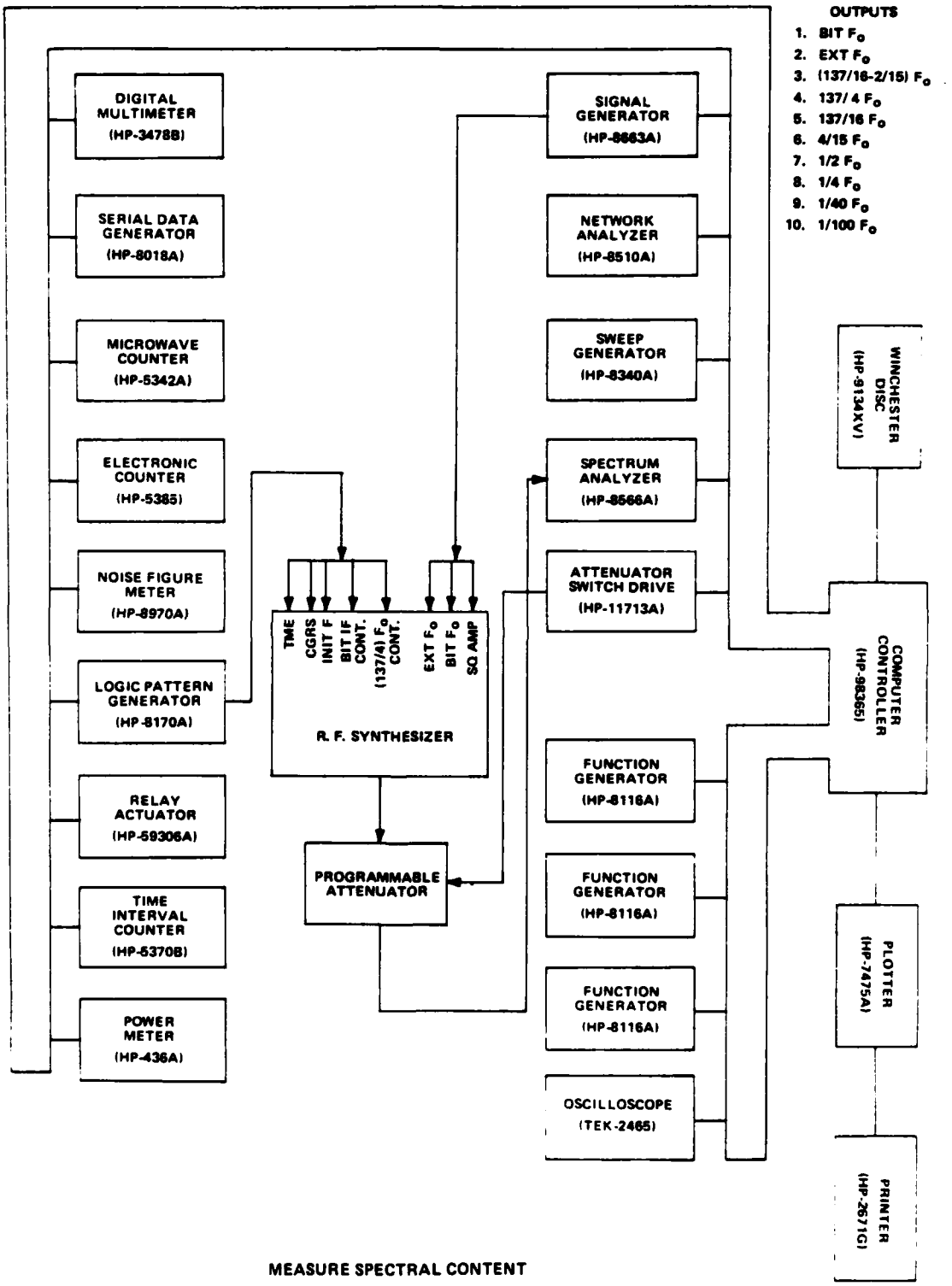
	Output Name	Output Level	Equipment Used
1.	Ext Fo	TBD	Spectrum Anal. (HP-8566A)
2.			Prog. Atten. (HP-8494G)
3.			Att Sw Drive (HP-11713A)
4.			
5.			

Test Procedure: Hook up unit under test as shown in schematic. Turn on test equipment. Set measurement equipment to proper ranges. Apply proper signal levels to inputs of synthesizer board. Measure the spectral content of the Ext Fo output with the Spectrum Analyzer checking for spurious outputs, harmonic levels, frequency stability etc.

Data Reduction: Send input levels to printer. Output of Spectrum Analyzer to plotter.

Equipment List:

1.	Signal Gen. (HP-8663A)	4.	Printer (HP-2671G)	7.	Att Sw Dr. (HP-11713A)
2.	Log Patt Gen (HP-8170A)	5.	Spec. Anal. (HP-8566A)	8.	Plotter (HP-7475A)
3.	Computer (HP-9836S)	6.	Prog. Atten. (HP-8494G)	9.	



MEASURE SPECTRAL CONTENT

Contractor: Rockwell-Collins

Board Tested: RF Synthesizer

Test Objective: Verify proper spectral content of synthesizer BIT Fo output.

Inputs

	Input Name	Input Level	Equipment Used
1.	* Fo (3 inputs)	10.23MHz @ TBD	Signal Gen. (HP-8663A)
2.	** Time Mark Enable	TBD	Log Patt. Gen. (HP-8170A)
3.	** Code Gen. Reset Strobe	TBD	Log Patt. Gen. (HP-8170A)
4.	** Init F	TBD	Log Patt. Gen. (HP-8170A)
5.	** BIT IF Control	TBD	Log Patt. Gen. (HP-8170A)
6.	** 137/4 Fo Control	TBD	Log Patt. Gen. (HP-8170A)
7.			
8.			
9.			
10.			
11.			
12.			

* Power splitter needed to provide these 3 inputs.

** Breakout board needed to provide various levels for these 5 inputs.

Outputs

	Output Name	Output Level	Equipment Used
1.	BIT Fo	TBD	Spectrum Anal. (HP-8566A)
2.			Prog. Atten. (HP-8494G)
3.			Att Sw Drive (HP-11713A)
4.			
5.			

Test Procedure: Hook up unit under test as shown in schematic. Turn on test equipment. Set measurement equipment to proper ranges. Apply proper signal levels to inputs of synthesizer board. Measure the spectral content of the Bit Fo output with the Spectrum Analyzer checking for spurious outputs, harmonic levels, frequency stability etc.

Data Reduction: Send input levels to printer. Output of Spectrum Analyzer to plotter.

Equipment List:

1.	Signal Gen. (HP-8663A)	4.	Printer (HP-2671G)	7.	Att Sw Drive (HP-11713A)
2.	Log Patt Gen (HP-8170A)	5.	Spec. Anal. (HP-8566A)	8.	Plotter (HP-7475A)
3.	Computer (HP-9836S)	6.	Prog. Atten (HP-8494G)	9.	

Contractor: Rockwell-Collins

Board Tested: RF Synthesizer

Test Objective: Verify proper spectral content of synthesizer ($^{137}/_{16}$ - 2/15)Fo output.

Inputs

	Input Name	Input Level	Equipment Used
1.	* Fo (3 inputs)	10.23MHz @ TBD	Signal Gen. (HP-8663A)
2.	** Time Mark Enable	TBD	Log Patt. Gen. (HP-8170A)
3.	** Code Gen. Reset Strobe	TBD	Log Patt. Gen. (HP-8170A)
4.	** Init F	TBD	Log Patt. Gen. (HP-8170A)
5.	** BIT IF Control	TBD	Log Patt. Gen. (HP-8170A)
6.	** $^{137}/_{4}$ Fo Control	TBD	Log Patt. Gen. (HP-8170A)
7.			
8.			
9.			
10.			
11.			
12.			

* Power splitter needed to provide these 3 inputs.

** Breakout board needed to provide various levels for these 5 inputs.

Outputs

	Output Name	Output Level	Equipment Used
1.	$(^{137}/_{16} - 2/15)Fo$	TBD	Spec. Analyzer (HP-8566A)
2.			Prog. Atten. (HP-8494G)
3.			Att. Sw Drive (HP-11713A)
4.			
5.			

Test Procedure: Hook up unit under test as shown in schematic. Turn on test equipment. Set measurement equipment to proper ranges. Apply proper signal levels to inputs of synthesizer board. Measure the spectral content of the $(^{137}/_{16} - 2/15)Fo$ output with the Spectrum Analyzer checking for spurious outputs, harmonic levels, frequency stability etc.

Data Reduction: Send input levels to printer. Output of Spectrum Analyzer to plotter.

Equipment List:

1.	Signal Gen. (HP-8663A)	4.	Printer (HP-2671G)	7.	Att Sw Dr. (HP-11713A)
2.	Log Patt Gen (HP-8170A)	5.	Spec. Anal. (HP-8566A)	8.	Plotter (HP-7475A)
3.	Computer (HP-9836S)	6.	Prog. Atten. (HP-8494G)	9.	

Contractor: Rockwell-Collins

Board Tested: RF Synthesizer

Test Objective: Verify proper spectral content of synthesizer ($^{137}/_{4}$)Fo output.

Inputs

	Input Name	Input Level	Equipment Used
1.	* Fo (3 inputs)	10.23MHz @ TBD	Signal Gen. (HP-8663A)
2.	** Time Mark Enable	TBD	Log Patt. Gen. (HP-8170A)
3.	** Code Gen. Reset Strobe	TBD	Log Patt. Gen. (HP-8170A)
4.	** Init F	TBD	Log Patt. Gen. (HP-8170A)
5.	** BIT IF Control	TBD	Log Patt. Gen. (HP-8170A)
6.	** $^{137}/_{4}$ Fo Control	TBD	Log Patt. Gen. (HP-8170A)
7.			
8.			
9.			
10.			
11.			
12.			

* Power splitter needed to provide these 3 inputs.

** Breakout board needed to provide various levels for these 5 inputs.

Outputs

	Output Name	Output Level	Equipment Used
1.	$(^{137}/_{4})$Fo	TBD	Spec. Anal. (HP-8566A)
2.			Prog. Atten. (HP-8494G)
3.			Att Sw Drive (HP-11713A)
4.			
5.			

Test Procedure: Hook up unit under test as shown in schematic. Turn on test equipment. Set measurement equipment to proper ranges. Apply proper signal levels to inputs of synthesizer board. Measure the spectral content of the $(^{137}/_{4})$Fo output with the Specturm Analyzer checking for spurious outputs, harmonic levels, frequency stability etc.

Data Reduction: Send input levels to printer. Output of Spectrum Analyzer to plotter.

Equipment List:

1.	Signal Gen. (HP-8170A)	4.	Printer (HP-2671G)	7.	Att Sw Dr. (HP-11713A)
2.	Log Patt Gen (HP-8170A)	5.	Spec. Anal. (HP-8566A)	8.	Plotter (HP-7475A)
3.	Computer (HP-9836S)	6.	Prog. Atten. (HP-8494G)	9.	

Contractor: Rockwell-Collins

Board Tested: RF Synthesizer

Test Objective: Verify proper spectral content of synthesizer ($^{137}/_{16}$)Fo output.

Inputs

	Input Name	Input Level	Equipment Used
1.	* Fo (3 inputs)	10.23MHz @ TBD	Signal Gen. (HP-8663A)
2.	** Time Mark Enable	TBD	Log Patt. Gen. (HP-8170A)
3.	** Code Gen. Reset Strobe	TBD	Log Patt. Gen. (HP-8170A)
4.	** Init F	TBD	Log Patt. Gen. (HP-8170A)
5.	** BIT IF Control	TBD	Log Patt. Gen. (HP-8170A)
6.	** $^{137}/_{4}$ Fo Control	TBD	Log Patt. Gen. (HP-8170A)
7.			
8.			
9.			
10.			
11.			
12.			

* Power splitter needed to provide these 3 inputs.

** Breakout board needed to provide various levels for these 5 inputs.

Outputs

	Output Name	Output Level	Equipment Used
1.	$(^{137}/_{16})$Fo	TBD	Spec. Anal. (HP-8566A)
2.			Prcg. Atten. (HP-8494G)
3.			Att. Sw Drive (HP-11713A)
4.			
5.			

Test Procedure: Hook up unit under test as shown in schematic. Turn on test equipment. Set measurement equipment to proper ranges. Apply proper signal levels to inputs of synthesizer board. Measure the spectral content of the $(^{137}/_{16})$Fo output with the Spectrum Analyzer checking for spurious outputs, harmonic levels, frequency stability etc.

Data Reduction: Send input levels to printer. Output of Spectrum Analyzer to plotter.

Equipment List:

1.	Signal Gen. (HP-8663A)	4.	Printer (HP-2671G)	7.	Att Sw Dr. (HP-11713A)
2.	Log Patt Gen (HP-8170A)	5.	Spec. Anal. (HP-8566A)	8.	Plotter (HP-7475A)
3.	Computer (HP-9836S)	6.	Prog. Atten. (HP-8494G)	9.	

Contractor: Rockwell-Collins

Board Tested: RF Synthesizer

Test Objective: Verify proper spectral content of synthesizer (4/15)Fo output.

Inputs

	Input Name	Input Level	Equipment Used
1.	* Fo (3 inputs)	10.23MHz @ TBD	Signal Gen. (HP-8663A)
2.	** Time Mark Enable	TBD	Log Patt. Gen. (HP-8170A)
3.	** Code Gen. Reset Strobe	TBD	Log Patt. Gen. (HP-8170A)
4.	** Init F	TBD	Log Patt. Gen. (HP-8170A)
5.	** BIT IF Control	TBD	Log Patt. Gen. (HP-8170A)
6.	** 137/4 Fo Control	TBD	Log Patt. Gen. (HP-8170A)
7.			
8.			
9.			
10.			
11.			
12.			

* Power splitter needed to provide these 3 inputs.

** Breakout board needed to provide various levels for these 5 inputs.

Outputs

	Output Name	Output Level	Equipment Used
1.	(4/15) Fo	TBD	Spec. Anal. (HP-8566A)
2.			Prog. Atten. (HP-8494G)
3.			Att Sw Drive (HP-11713A)
4.			
5.			

Test Procedure: Hook up unit under test as shown in schematic. Turn on test equipment. Set measurement equipment to proper ranges. Apply proper signal levels to inputs of synthesizer board. Measure the spectral content of the (4/15)Fo output with the Spectrum Analyzer checking for spurious outputs, harmonic levels, frequency stability etc. Repeat for the following frequency outputs: $\frac{1}{2}$Fo $\frac{1}{40}$ Fo $\frac{1}{4}$Fo $\frac{1}{100}$ Fo

Data Reduction: Send input levels to printer. Output of Spectrum Analyzer to plotter.

Equipment List:

1.	Signal Gen. (HP-8663A)	4.	Printer (HP-2671G)	7.	Att Sw Dr. (HP-11713A)
2.	Log Patt Gen (HP-8170A)	5.	Spec. Anal. (HP-8566A)	8.	Plotter (HP-7475A)
3.	Computer (HP-9836S)	6.	Prog. Atten. (HP-8494G)	9.	

Contractor: Rockwell-Collins

Board Tested: RF Synthesizer

Test Objective: Measure VSWR and impedance of ($^{137}/_{4}$)Fo output.

Inputs

	Input Name	Input Level	Equipment Used
1.	S-Par Test Set	TBD	Sweep Gen. (HP-8340A)
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			

Outputs

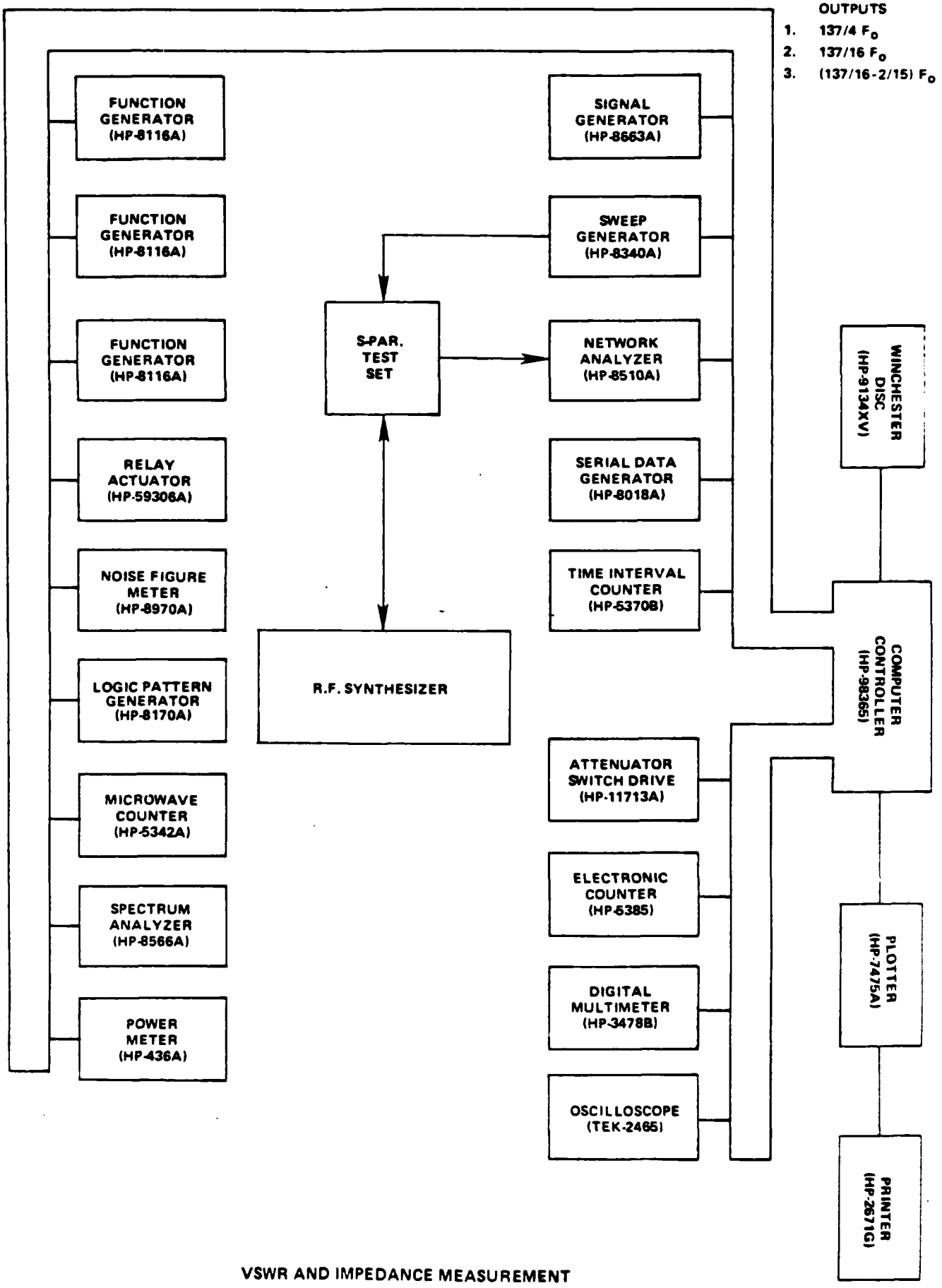
	Output Name	Output Level	Equipment Used
1.	$(^{137}/_{4})$Fo	TBD	Network Analyzer (HP-8510A)
2.			S-Par. Test Set (HP-8515A)
3.			
4.			
5.			

Test Procedure: Turn on test equipment. Set measurement equipment to proper ranges. Apply input signal to S-Parameter Test Set from Sweep Generator. Measure VSWR and impedance with Network Analyzer.

Data Reduction: Send input level to printer. Output of Network Analyzer to plotter.

Equipment List:

1.	Computer (HP-9836S)	4.	S-Par. Test Set (HP-8515A)	7.	
2.	Printer (HP-2671G)	5.	Network Anal. (HP-8510A)	8.	
3.	Plotter (HP-7475A)	6.	Sweep Gen. (HP-8340A)	9.	



VSWR AND IMPEDANCE MEASUREMENT

Contractor: Rockwell-Collins

Board Tested: RF Synthesizer

Test Objective: Measure VSWR and impedance ($^{137}/_{16}$)Fo output.

Inputs

	Input Name	Input Level	Equipment Used
1.	S-Par. Test Set	TBD	Sweep Gen. (HP-8340A)
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			

Outputs

	Output Name	Output Level	Equipment Used
1.	$(^{137}/_{16})Fo$	TBD	Network Analyzer (HP-8510A)
2.			S-Par. Test Set (HP-8515A)
3.			
4.			
5.			

Test Procedure: Turn on test equipment. Set measurement equipment to proper ranges. Apply input signal to S-Parameter Test Set from Sweep Generator. Measure VSWR and impedance with Network Analyzer.

Data Reduction: Send input levels to printer. Output of Network Analyzer to plotter.

Equipment List:

1.	Computer (HP-9836S)	4.	S-Par Test Set (HP-8515A)	7.	
2.	Printer (HP-2671G)	5.	Network Anal. (HP-8510A)	8.	
3.	Plotter (HP-7475A)	6.	Sweep Generator (HP-8340A)	9.	

Contractor: Rockwell-Collins

Board Tested: RF Synthesizer

Test Objective: Measure VSWR and impedance of ($^{137}/_{16}$ - 2/15)Fo output.

Inputs

	Input Name	Input Level	Equipment Used
1.	S-Par. Test Set	TBD	Sweep Generator (HP-8340A)
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			

Outputs

	Output Name	Output Level	Equipment Used
1.	$(^{137}/_{16} - 2/15)Fo$	TBD	Network Anal. (HP-8510A)
2.			S-Par. Test Set (HP-8515A)
3.			
4.			
5.			

Test Procedure: Turn on test equipment. Set measurement equipment to proper ranges. Apply input signal to S-Parameter Test Set from Sweep Generator. Measure VSWR and impedance with Network Analyzer.

Data Reduction: Send input levels to printer. Output of Network Analyzer to plotter.

Equipment List:

1.	Computer (HP-9836S)	4.	S-Par Test Set (HP-8515A)	7.	
2.	Printer (HP-2671G)	5.	Network Anal. (HP-8510A)	8.	
3.	Plotter (HP-7475A)	6.	Sweep Gen. (HP-8340A)	9.	

3.1.1.3 CORRELATOR MODULE

Contractor: Rockwell-Collins

Board Tested: Correlator

Test Objective: Measure Receiver Local Bus output.

Inputs

	Input Name	Input Level	Equipment Used
1.	17F(IF)	173.91MHz @ TBD	Signal Gen. (HP-8663A)
2.	Code Gen. Reset	TBD	Logic Patt. Gen. (HP-8170A)
3.	$(137/16)Fo$	87.594MHz @ TBD	Sweep Gen. (HP-8340A)
4.	$(4/15)Fo$	2.728MHz @ TBD	Function Gen. (HP-8116A)
5.	** $(1/40)$ Fo	255.750Hz @ TBD	Function Gen. (HP-8116A)
6.	$(\frac{1}{2})Fo$	5.115MHz @ TBD	Function Gen. (HP-8116A)
7.	*$(\frac{1}{4})Fo$	2.5575MHz @ TBD	Function Gen. (HP-8116A)
8.	T20	TBD	Logic Patt. Gen. (HP-8170A)
9.	L1 AGC	TBD	Function Gen. (HP-8116A)
10.	*** L2 AGC	TBD	Function Gen. (HP-8116A)
11.	Analog Inputs	TBD	External Source
12.			

* Need divide by 2
** Need multiply by 3, divide by 32
*** Need 2 way power divider

Outputs

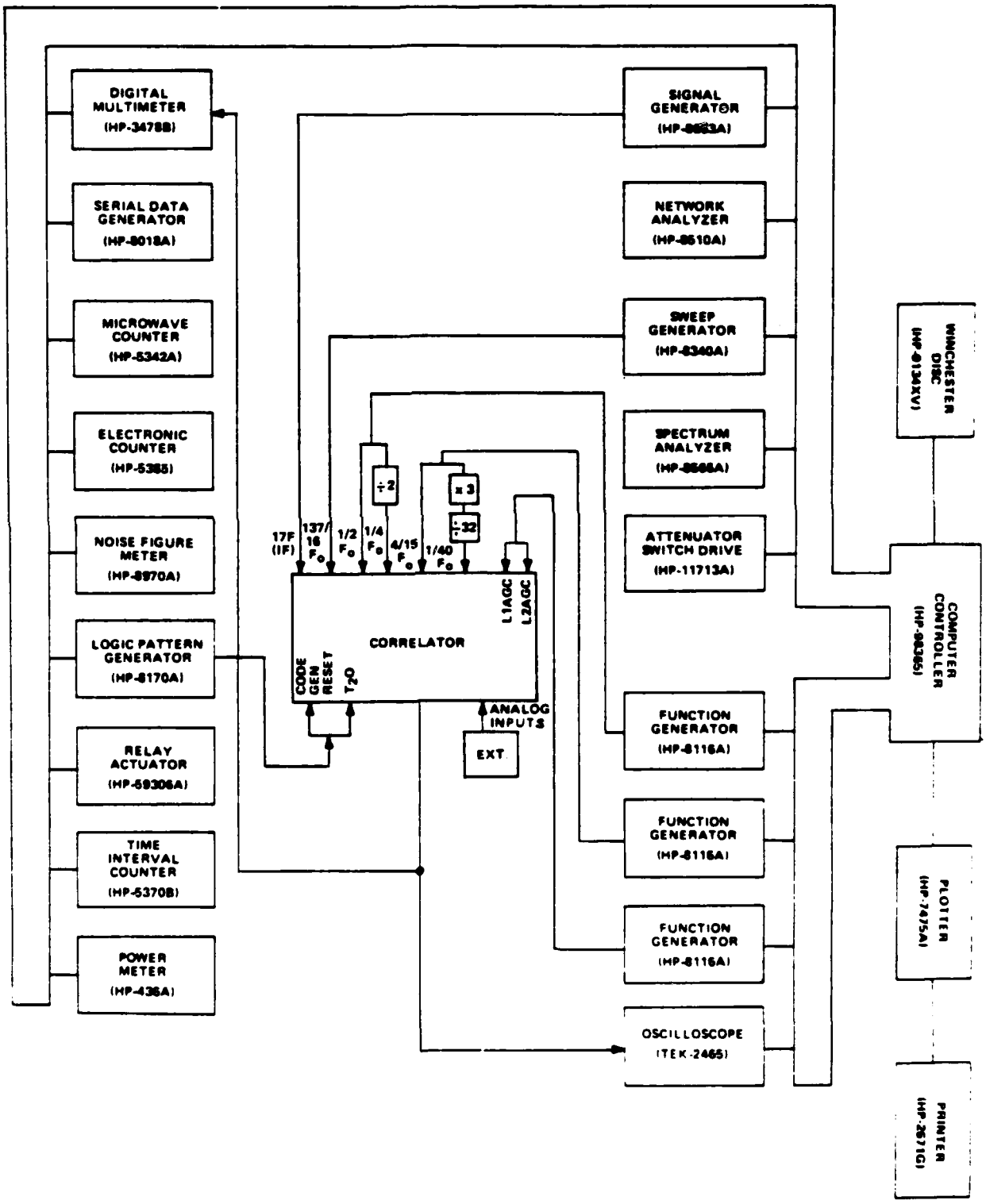
	Output Name	Output Level	Equipment Used
1.	Receiver Local Bus	TBD	Digital Multi. (HP-3478B)
2.			Oscilloscope (TEK-2465)
3.			
4.			
5.			

Test Procedure: Turn on test equipment. Set measurement equipment to proper ranges. Apply proper signal levels to all inputs. Measure Receiver Local Bus output with Digital Multimeter. An Oscilloscope will be used to display waveform.

Data Reduction: Send input levels and output of Digital Multimeter to printer. Output of Oscilloscope to plotter.

Equipment List:

1.	Computer (HP-9836S)	4.	Signal Gen. (HP-8663A)	7.	Printer (HP-2671G)
2.	(3) Function Gens. (HP-8116A)	5.	Sweep Gen. (HP-8340A)	8.	Oscilloscope (TEK-2465)
3.	Log. Patt. Gen. (HP-8170A)	6.	Digital Multi. (HP-3478B)	9.	External Source
10.	Plotter (HP-7475A)				


DIGITAL MULTIMETER (HP-3478B)
SERIAL DATA GENERATOR (HP-8018A)
MICROWAVE COUNTER (HP-5342A)
ELECTRONIC COUNTER (HP-5385)
NOISE FIGURE METER (HP-8970A)
LOGIC PATTERN GENERATOR (HP-8170A)
RELAY ACTUATOR (HP-59306A)
TIME INTERVAL COUNTER (HP-5370B)
POWER METER (HP-436A)
SIGNAL GENERATOR (HP-8683A)
NETWORK ANALYZER (HP-8510A)
SWEEP GENERATOR (HP-8340A)
SPECTRUM ANALYZER (HP-8568A)
ATTENUATOR SWITCH DRIVE (HP-11713A)
FUNCTION GENERATOR (HP-8116A)
FUNCTION GENERATOR (HP-8116A)
FUNCTION GENERATOR (HP-8116A)
OSCILLOSCOPE (TEK-2465)
WINCHESTER DISC (HP-9134XV)
COMPUTER CONTROLLER (HP-9836S)
PLOTTER (HP-7475A)
PRINTER (HP-2671G)
÷2
x 3
÷32
17F (IF)
137/16 Fo
1/2 Fo
1/4 Fo
4/15 Fo
1/40 Fo
L1AGC
L2AGC
CORRELATOR
CODE GEN RESET
T2O
ANALOG INPUTS
EXT

Contractor: Rockwell-Collins

Board Tested: Correlator

Test Objective: Verify Code Generator Reset Strobe operational.

Inputs

	Input Name	Input Level	Equipment Used
1.	17F(IF)	173.91MHz @ TBD	Signal Gen. (HP-8663A)
2.	Code Gen. Reset	TBD	Logic Patt. Gen. (HP-8170A)
3.	$(^{137}/_{16})$ Fo	87.594MHz @ TBD	Sweep Gen. (HP-8340A)
4.	$(^{4}/_{15})$ Fo	2.728MHz @ TBD	Function Gen. (HP-8116A)
5.	** $(^{1}/_{40})$ Fo	255,750Hz @ TBD	Function Gen. (HP-8116A)
6.	$(\frac{1}{2})$ Fo	5.115MHz @ TBD	Function Gen. (HP-8116A)
7.	* $(\frac{1}{2})$ Fo	2.5575MHz @ TBD	Function Gen. (HP-8116A)
8.	T20	TBD	Logic Patt. Gen. (HP-8170A)
9.	L1 AGC	TBD	Function Gen. (HP-8116A)
10.	*** L2 AGC	TBD	Function Gen. (HP-8116A)
11.	Analog Inputs	TBD	External Source
12.			

* Need divide by 2
** Need multiply be 3, divide by 32
*** Need 2 way power divider

Outputs

	Output Name	Output Level	Equipment Used
1.	Code Gen. Reset Strobe	TBD	Digital Multi. (HP-3478B)
2.			Oscilloscope (TEK-2465)
3.			
4.			
5.			

Test Procedure: Turn on test equipment. Set measurement equipment to proper ranges. Apply proper signal levels to all inputs. Measure Code Generator Reset Strobe output with Digital Multimeter. An Oscilloscope will be used to display waveform.

Data Reduction: Send input levels and output of Digital Multimeter to printer. Output of Oscilloscope to plotter.

Equipment List:

1.	Computer (HP-9836S)	4.	Signal Gen. (HP-8663A)	7.	Printer (HP-2671G)
2.(3)	Func. Gens. (HP-8116A)	5.	Sweep Gen. (HP-8340A)	8.	Oscilloscope (TEK-2465)
3.	Logic Patt. Gen. (HP-8170A)	6.	Digital Multi. (HP-3478B)	9.	External Source
10.	Plotter (HP-7475A)				

Contractor: Rockwell-Collins

Board Tested: Correlator

Test Objective: Verify Switch Select operational.

Inputs

	Input Name	Input Level	Equipment Used
1.	17F(IF)	173.91MHz @ TBD	Signal Gen. (HP-8663A)
2.	Code Gen. Reset	TBD	Logic Patt. Gen. (HP-8170A)
3.	$(^{137}/_{16})$ Fo	87.594MHz @ TBD	Function Gen. (HP-8116A)
4.	$(^{4}/_{15})$ Fo	2.728MHz @ TBD	Function Gen. (HP-8116A)
5.	** $(^{1}/_{40})$ Fo	255.750Hz @ TBD	Function Gen. (HP-8116a)
6.	$(\frac{1}{2})$ Fo	5.115MHz @ TBD	Function Gen. (HP-8116A)
7.	* $(\frac{1}{4})$ Fo	2.5575MHz @ TBD	Function Gen. (HP-8116A)
8.	T20	TBD	Logic Patt. Gen. (HP-8170A)
9.	L1 AGC	TBD	Function Gen. (HP-8116A)
10.	*** L2 AGC	TBD	Function Gen. (HP-8116A)
11.	Analog Inputs	TBD	External Source
12.			

* Need divide by 2
** Need multiply by 3, divide by 32
*** Need 2 way power divider

Outputs

	Output Name	Output Level	Equipment Used
1.	Switch Select	TBD	Digital Multi. (HP-3478B)
2.			Oscilloscope (TEK-2465)
3.			
4.			
5.			

Test Procedure: Turn on test equipment. Set measurement equipment to proper ranges. Apply proper signal levels to all inputs. Measure Switch Select output with Digital Multimeter. An Oscilloscope will be used to display waveform.

Data Reduction: Send input levels and output of Digital Multimeter to printer. Output of Oscilloscope to plotter.

Equipment List:

1.	Computer (HP-9836S)	4.	Sig. Gen. (HP-8663A)	7.	Printer (HP-2671G)
2.	(3) Func. Gens. (HP-8116A)	5.	Sweep Gen. (HP-8340A)	8.	Oscilloscope (TEK-2465)
3.	Logic Patt Gen (HP-8170A)	6.	Digital Multi. (HP-3478B)	9.	External Source
10.	Plotter (HP-7475A)				

3.1.1.4 IF PROCESSOR MODULE

Contractor: Rockwell-Collins

Board Tested: IF Processor

Test Objective: Verify L1 AGC operational.

Inputs

	Input Name	Input Level	Equipment Used
1.	Switch Select Input 1	TBD	Logic Patt. Gen. (HP-8170A)
2.	Switch Select Input 2	TBD	Logic Patt. Gen. (HP-8170A)
3.	Switch Select Input 3	TBD	Logic Patt. Gen. (HP-8170A)
4.	Switch Select Input 4	TBD	Logic Patt. Gen. (HP-8170A)
5.	Switch Select Input 5	TBD	Logic Patt. Gen. (HP-8170A)
6.	L1 BIT Control	TBD	Logic Patt. Gen. (HP-8170A)
7.	L2 BIT Control	TBD	Logic Patt. Gen. (HP-8170A)
8.	Noise Diode Control	TBD	Logic Patt. Gen. (HP-8170A)
9.	BIT Fo	TBD	Function Generator (HP-8116A)
10.	BIT Code	TBD	*In-house Generator
11.	L1 Coax	TBD	Signal Gen. (HP-8663A)
12.	L2 Coax	TBD	Signal Gen. (HP-8663A)
13.	$(^{137}/_{4})$ Fo	350.3775MHz @ TBD	Sweep Gen. (HP-8340A)

* In-house designed P-Code Generator (may also need C/A Code Generator)

Outputs

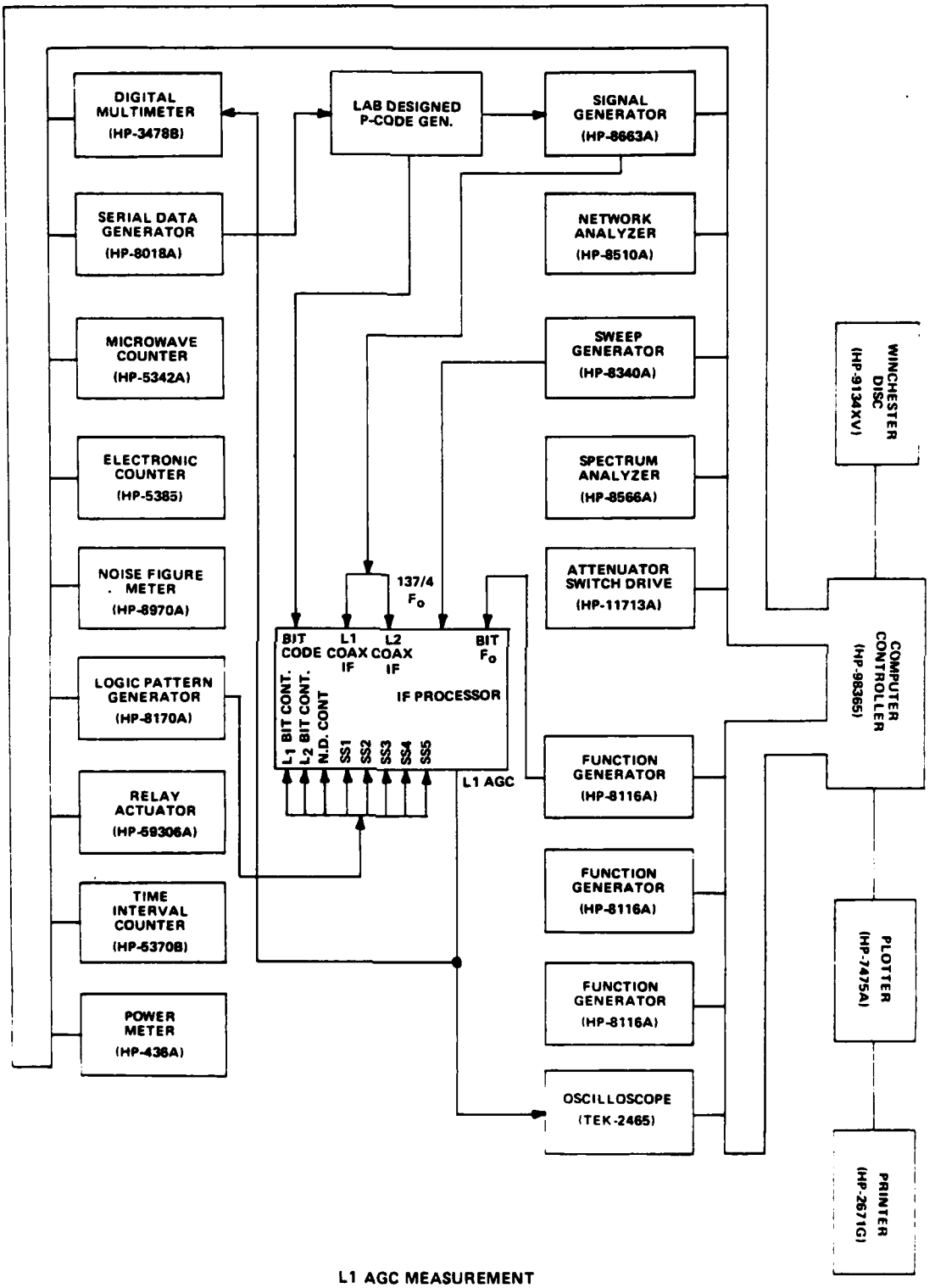
	Output Name	Output Level	Equipment Used
1.	L1 AGC	TBD	Digital Multi. (HP-3478B)
2.			Oscilloscope (TEK-2465)
3.			
4.			
5.			

Test Procedure: Turn on test equipment. Set measurement equipment to proper ranges. Apply proper signal levels to all inputs. Measure L1 AGC output with Digital Multimeter. An Oscilloscope will be used to display waveform.

Data Reduction: Send input levels and output of Digital Multimeter to printer. Output of Oscilloscope to plotter.

Equipment List:

1.	Computer (HP-9836S)	4.	Signal Gen. (HP-8663A)	7.	Digital Multi. (HP-3478B)
2.	Log. Patt Gen (HP-8170A)	5.	Sweep Gen. (HP-8340A)	8.	Oscilloscope (TEK-2465)
3.	Function Gen. (HP-8116A)	6.	Printer (HP-2671G)	9.	In-house Design
10.	Serial Data Gen. (HP-8018A)	12.	Plotter (HP-7475A)		



L1 AGC MEASUREMENT

Contractor: Rockwell-Collins

Board Tested: IF Processor

Test Objective: Verify L2 AGC operational.

Inputs

	Input Name	Input Level	Equipment Used
1.	Switch Select Input 1	TBD	Logic Patt. Gen. (HP-8170A)
2.	Switch Select Input 2	TBD	Logic Patt. Gen. (HP-8170A)
3.	Switch Select Input 3	TBD	Logic Patt. Gen. (HP-8170A)
4.	Switch Select Input 4	TBD	Logic Patt. Gen. (HP-8170A)
5.	Switch Select Input 5	TBD	Logic Patt. Gen. (HP-8170A)
6.	L1 BIT Control	TBD	Logic Patt. Gen. (HP-8170A)
7.	L2 BIT Control	TBD	Logic Patt. Gen. (HP-8170A)
8.	Noise Diode Control	TBD	Logic Patt. Gen. (HP-8170A)
9.	BIT Fo	TBD	Function Generator (HP-8116A)
10.	BIT Code	TBD	*In-house Generator
11.	L1 Coax	TBD	Signal Gen. (HP-8663A)
12.	L2 Coax	TBD	Signal Gen. (HP-8663A)
13.	$(^{137}/_{4})$ Fo	350.3775MHz @ TBD	Sweep Gen. (HP-8340A)

* In-house designed P-Code Generator (may also need C/A Code Generator)

Outputs

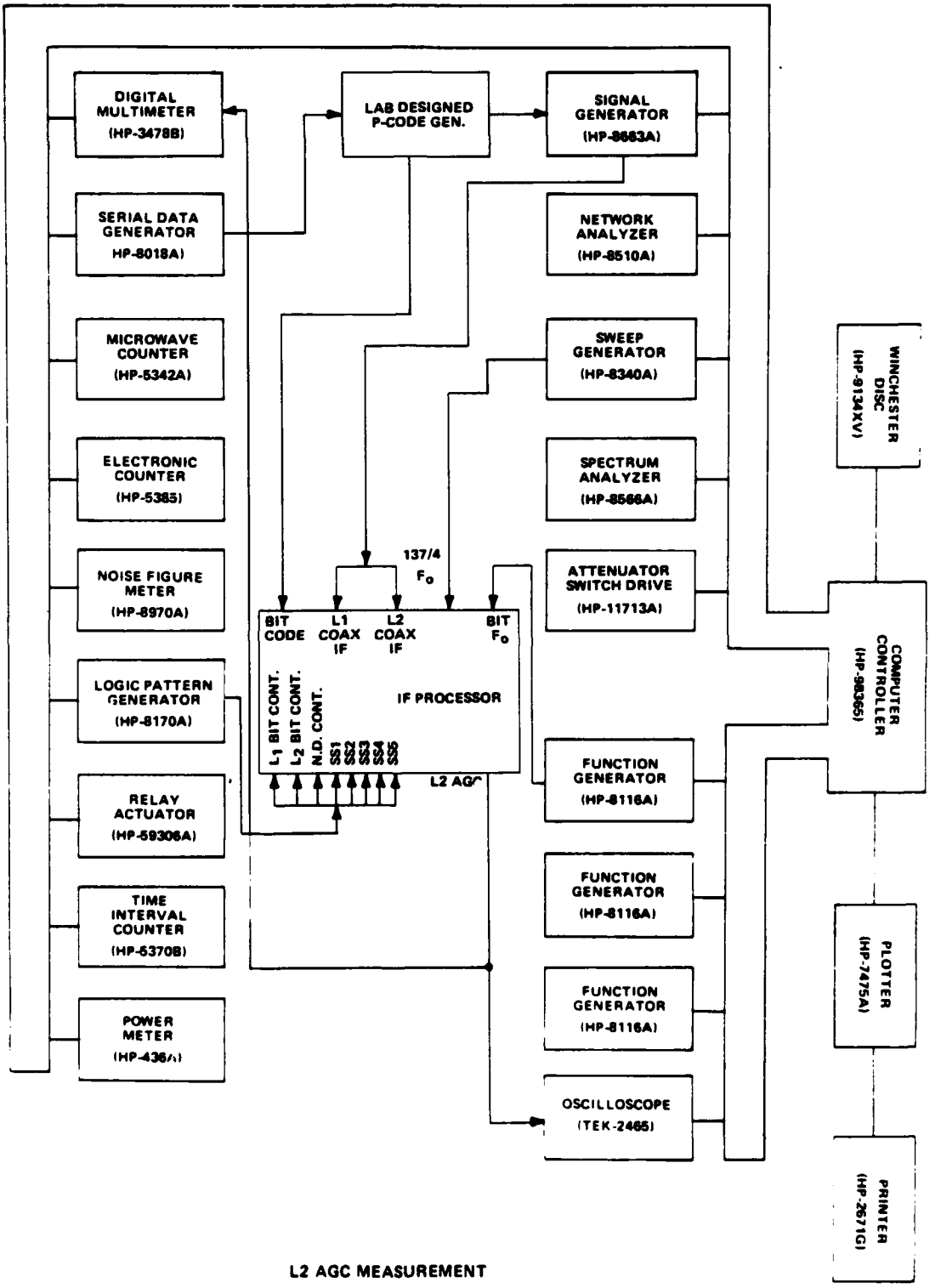
	Output Name	Output Level	Equipment Used
1.	L2 AGC	TBD	Digital Multi. (HP-3478B)
2.			Oscilloscope (TEK-2465)
3.			
4.			
5.			

Test Procedure: Turn on test equipment. Set measurement equipment to proper ranges. Apply proper signal levels to all inputs. Measure L2 AGC output with Digital Multimeter. An Oscilloscope will be used to display waveform.

Data Reduction: Send input levels and output of Digital Multimeter to printer. Output of Oscilloscope to plotter.

Equipment List:

1.	Computer (HP-9836S)	4.	Signal Gen. (HP-8663A)	7.	Digital Multi. (HP-3478B)
2.	Log. Patt Gen (HP-8170A)	5.	Sweep Gen. (HP-8340A)	8.	Oscilloscope (TEK-2465)
3.	Function Gen. (HP-8116A)	6.	Printer (HP-2671G)	9.	In-house Design
10.	Serial Data Gen. (HP-8018A)	12.	Plotter (HP-7475A)		



L2 AGC MEASUREMENT

Contractor: Rockwell-Collins

Board Tested: IF Processor

Test Objective: Measure 17F(IF) output frequency.

Inputs

	Input Name	Input Level	Equipment Used
1.	Switch Select Input 1	TBD	Logic Patt. Gen. (HP-8170A)
2.	Switch Select Input 2	TBD	Logic Patt. Gen. (HP-8170A)
3.	Switch Select Input 3	TBD	Logic Patt. Gen. (HP-8170A)
4.	Switch Select Input 4	TBD	Logic Patt. Gen. (HP-8170A)
5.	Switch Select Input 5	TBD	Logic Patt. Gen. (HP-8170A)
6.	L1 BIT Control	TBD	Logic Patt. Gen. (HP-8170A)
7.	L2 BIT Control	TBD	Logic Patt. Gen. (HP-8170A)
8.	Noise Diode Control	TBD	Logic Patt. Gen. (HP-8170A)
9.	BIT Fo	TBD	Logic Patt. Gen. (HP-8170A)
10.	BIT Code	TBD	* In House Generator
11.	L1 Coax	TBD	Signal Generator (HP-8663A)
12.	L2 Coax	TBD	Signal Generator (HP-8663A)
13.	(137/4) Fo	350.3775MHz @ TBD	Sweep Generator (HP-8340A)

* In-House designed P-Code Generator (may also need C/A Code Generator)

Outputs

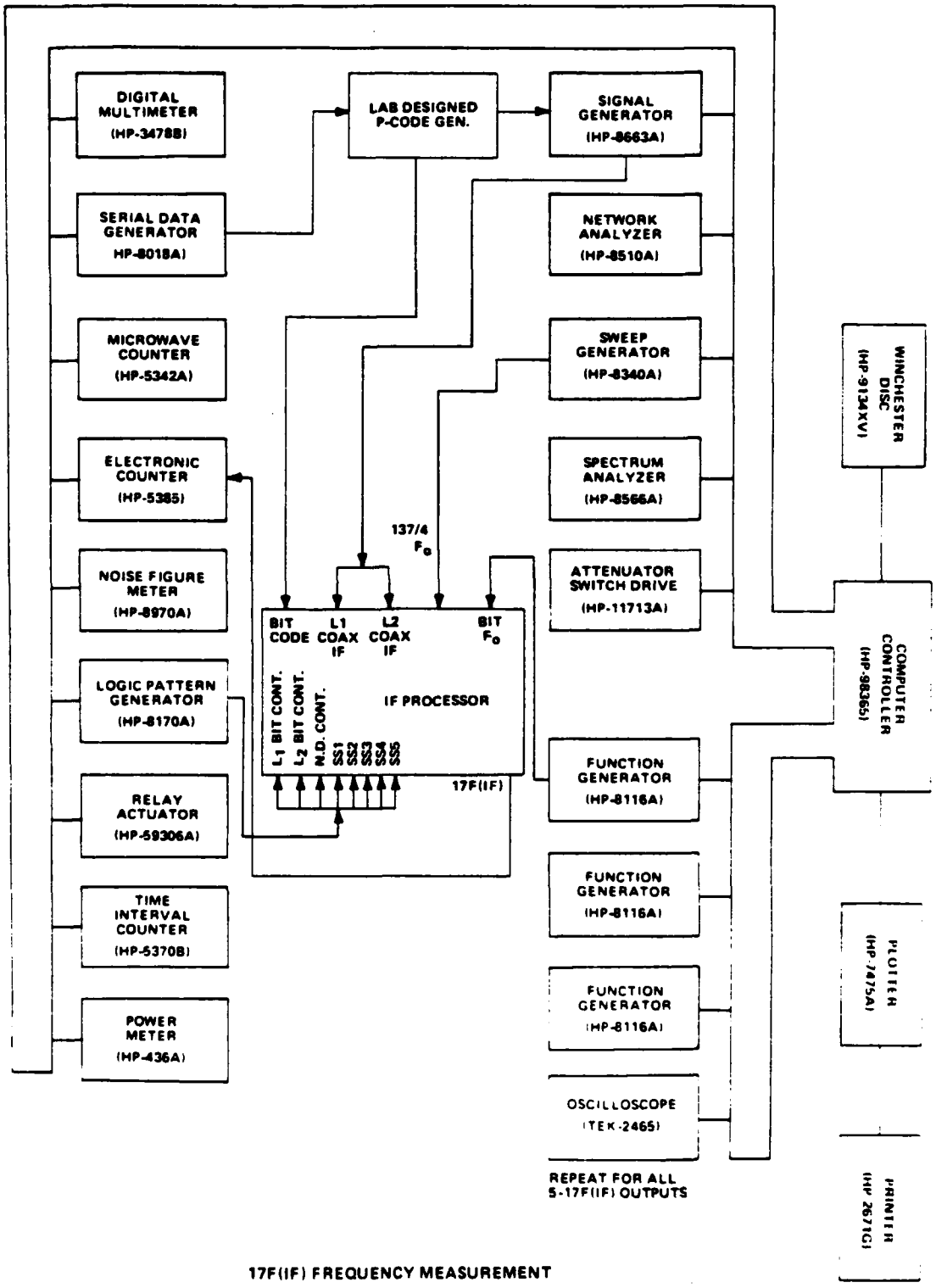
	Output Name	Output Level	Equipment Used
1.	17F(IF)	173.91MHz	Electronic Ctr (HP-5385)
2.			
3.			
4.			
5.			

Test Procedure: Turn on test equipment. Set measurement equipment to proper ranges. Apply proper signal levels to all inputs. Measure 17F(IF) output frequency with Electronic Counter. (Repeat for all 5 17F(IF) outputs).

Data Reduction: Send input levels and output of Electronic Counter to printer.

Equipment List:

1.	Computer (HP-9836S)	4.	Signal Gen. (HP-8663A)	7.	In-House Design
2.	Logic Patt. Gen. (HP-8170A)	5.	Printer (HP-2671G)	8.	Electronic Ctr (HP-5385)
3.	Function Gen. (HP-8116A)	6.	Sweep Gen. (HP-8340A)	9.	Serial Data Gen. (HP-8018A)



17F(IF) FREQUENCY MEASUREMENT

Contractor: Rockwell-Collins

Board Tested: IF Processor

Test Objective: Measure output power of 17F(IF) output.

Inputs

	Input Name	Input Level	Equipment Used
1.	Switch Select Input 1	TBD	Logic Patt. Gen. (HP-8170A)
2.	Switch Select Input 2	TBD	Logic Patt. Gen. (HP-8170A)
3.	Switch Select Input 3	TBD	Logic Patt. Gen. (HP-8170A)
4.	Switch Select Input 4	TBD	Logic Patt. Gen. (HP-8170A)
5.	Switch Select Input 5	TBD	Logic Patt. Gen. (HP-8170A)
6.	L1 BIT Control	TBD	Logic Patt. Gen. (HP-8170A)
7.	L2 BIT Control	TBD	Logic Patt. Gen. (HP-8170A)
8.	Noise Diode Control	TBD	Logic Patt. Gen. (HP-8170A)
9.	BIT Fo	TBD	Function Generator (HP-8116A)
10.	BIT Code	TBD	* In House Generator
11.	L1 Coax	TBD	Signal Generator (HP-8663A)
12.	L2 Coax	TBD	Signal Generator (HP-8663A)
13.	(137/4) Fo	350.3775MHz @ TBD	Sweep Generator (HP-8340A)

* In-House designed P-Code Generator (may also need C/A Code Generator)

Outputs

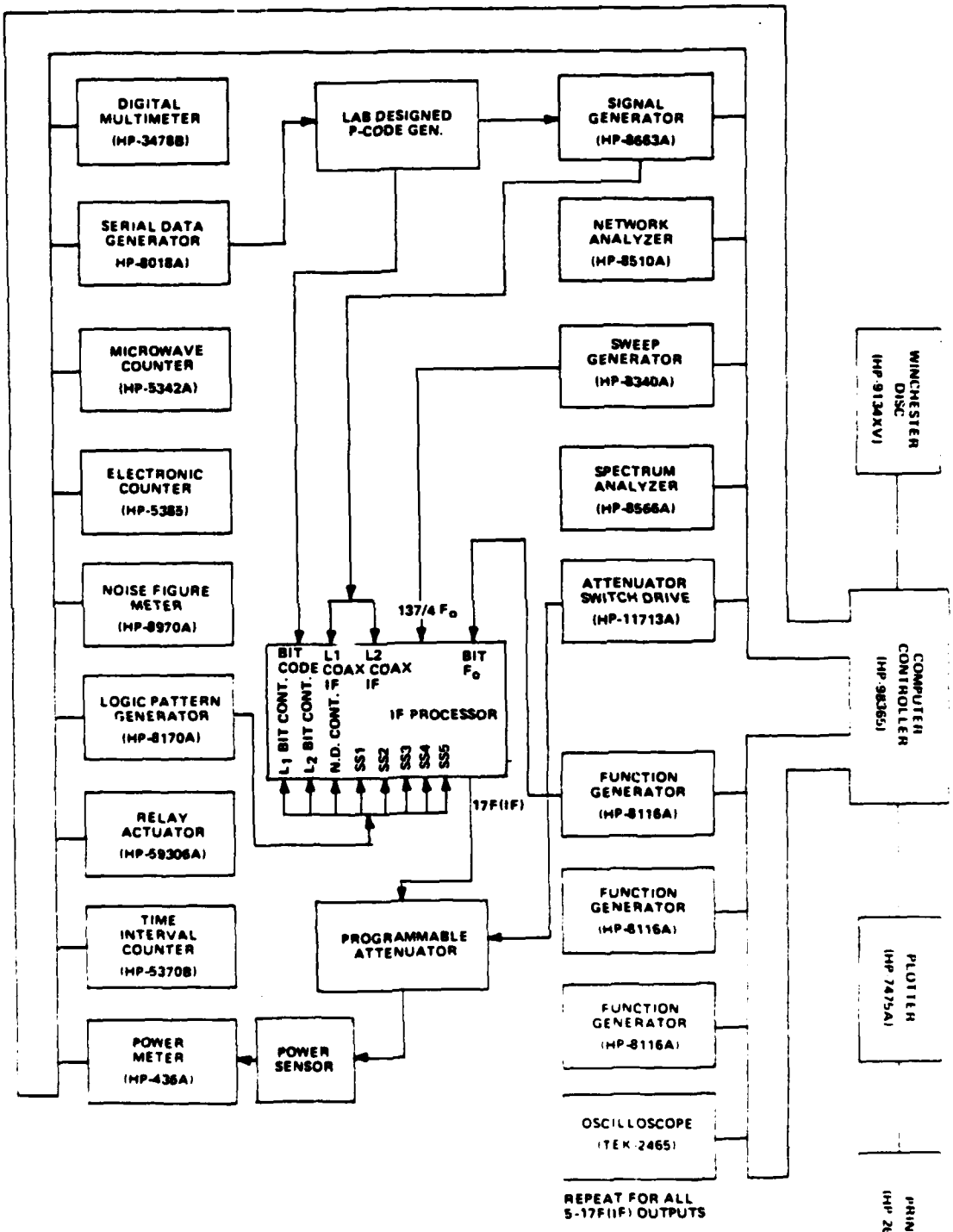
	Output Name	Output Level	Equipment Used
1.	17F(IF)	TBD	Power Meter (HP-436A)
2.			Power Sensor (HP-8481A)
3.			Att. Sw Drive (HP-11713A)
4.			Prog. Att. (HP-8494G)
5.			

Test Procedure: Turn on test equipment. Set measurement equipment to proper ranges. Apply proper signal levels to all inputs. Measure output power of 17F(IF) output with Power Meter. (Repeat for all 5 17F(IF) outputs)

Data Reduction: Send input levels and output of Power Meter to printer.

Equipment List:

1.	Computer (HP-9836S)	4.	Signal Gen. (HP-8663A)	7.	In-House Design
2.	Logic Patt Gen (HP-8170A)	5.	Printer (HP-2671G)	8.	Serial Data Gen. (HP-8018A)
3.	Func. Gen. (HP-8116A)	6.	Sweep Gen. (HP-8340A)	9.	Power Meter (HP-436A)
10.	Power Sensor (HP-8481A)	11.	Att. Sw Dr. (HP-11713A)	12.	Prog. Att. (HP-8494G)



17F(IF) POWER MEASUREMENT

Contractor: Rockwell-Collins

Board Tested: IF Processor

Test Objective: Measure spectral content of 17F(IF) output.

Inputs

	Input Name	Input Level	Equipment Used
1.	Switch Select Input 1	TBD	Logic Patt. Gen. (HP-8170A)
2.	Switch Select Input 2	TBD	Logic Patt. Gen. (HP-8170A)
3.	Switch Select Input 3	TBD	Logic Patt. Gen. (HP-8170A)
4.	Switch Select Input 4	TBD	Logic Patt. Gen. (HP-8170A)
5.	Switch Select Input 5	TBD	Logic Patt. Gen. (HP-8170A)
6.	L1 BIT Control	TBD	Logic Patt. Gen. (HP-8170A)
7.	L2 BIT Control	TBD	Logic Patt. Gen. (HP-8170A)
8.	Noise Diode Control	TBD	Logic Patt. Gen. (HP-8170A)
9.	BIT Fo	TBD	Function Generator (HP-8116A)
10.	BIT Code	TBD	* In-House Generator
11.	L1 Coax	TBD	Signal Generator (HP-8663A)
12.	L2 Coax	TBD	Signal Generator (HP-8663A)
10.	(137/4) Fo	350.3775MHz @ TBD	Sweep Generator (HP-8340A)

* In-House designed P-Code Generator (may also need C/A Code Generator)

Outputs

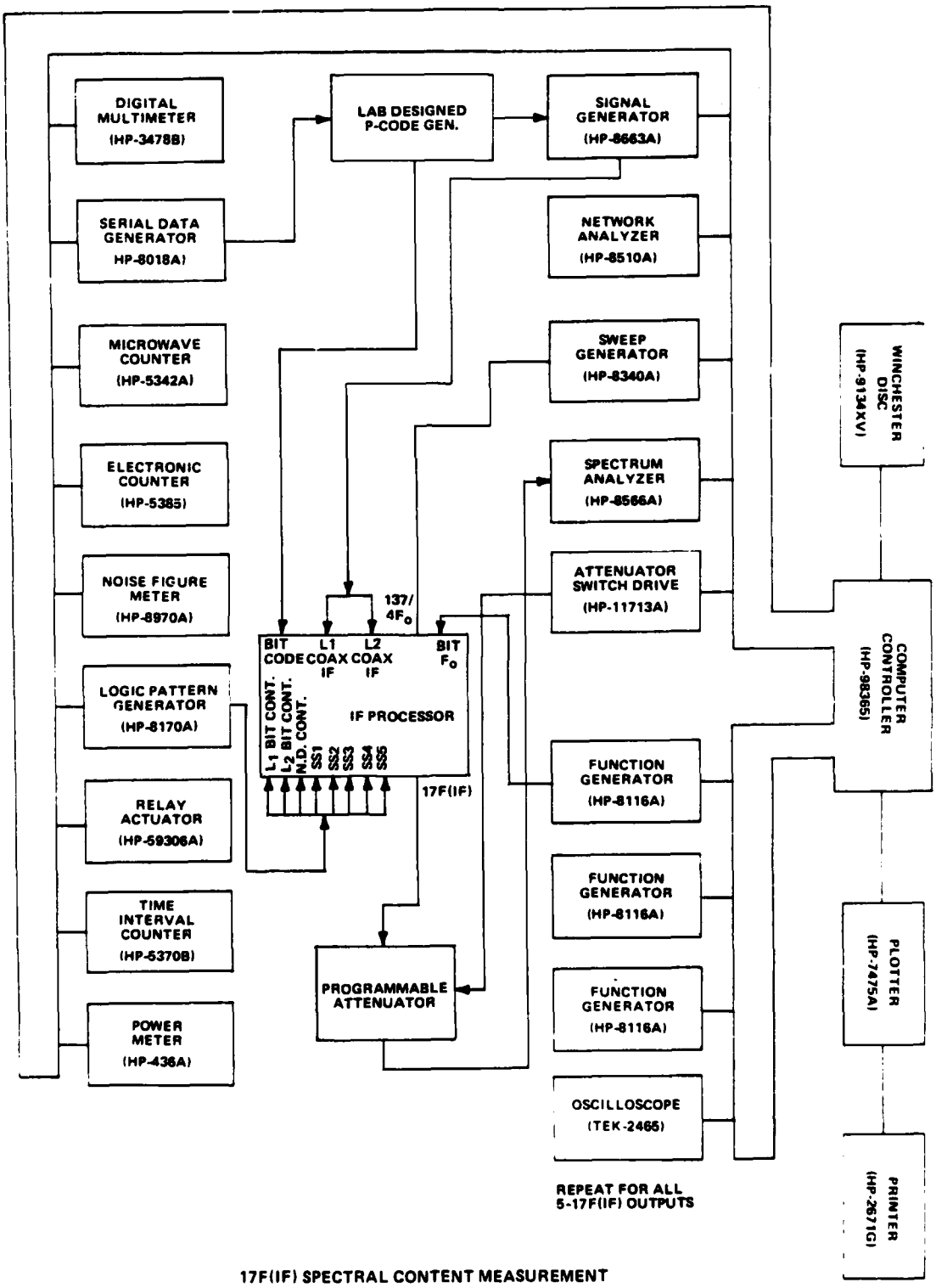
	Output Name	Output Level	Equipment Used
1.	17F(IF)	173.91MHz @ TBD	Spectrum Analyzer (HP-8566A)
2.			Att. Sw Drive (HP-11713A)
3.			Prog. Att. (HP-8494G)
4.			
5.			

Test Procedure: Turn on test equipment. Set measurement equipment to proper ranges. Apply proper signal levels to all inputs. Measure spectral content of 17F(IF) output with Spectrum Analyzer. (Repeat for all 5 17F(IF) outputs)

Data Reduction: Send input levels to printer. Output of Spectrum Analyzer to plotter.

Equipment List:

1.	Computer (HP-9836S)	4.	Signal Gen. (HP-8663A)	7.	In-House Design
2.	Logic Patt Gen (HP-8170A)	5.	Printer (HP-2671G)	8.	Serial Data Gen (HP-8018A)
3.	Func. Gen. (HP-8116A)	6.	Sweep Gen. (HP-8340A)	9.	Spectrum Anal. (HP-8566A)
10.	Att. Sw Dr. (HP-11713A)	11.	Prog. Att. (HP-8494G)	12.	Plotter (HP-7475A)



17F(IF) SPECTRAL CONTENT MEASUREMENT

Contractor: Rockwell-Collins

Board Tested: IF Processor

Test Objective: Measure output impedance and VSWR of 17F(IF) output.

Inputs

	Input Name	Input Level	Equipment Used
1.	S-Par Test Set	TBD	Sweep Gen. (HP-8340A)
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			

Outputs

	Output Name	Output Level	Equipment Used
1.	17F(IF)	TBD	Network Analyzer (HP-8510A)
2.			S-Par. Test Set (HP-8515A)
3.			
4.			
5.			

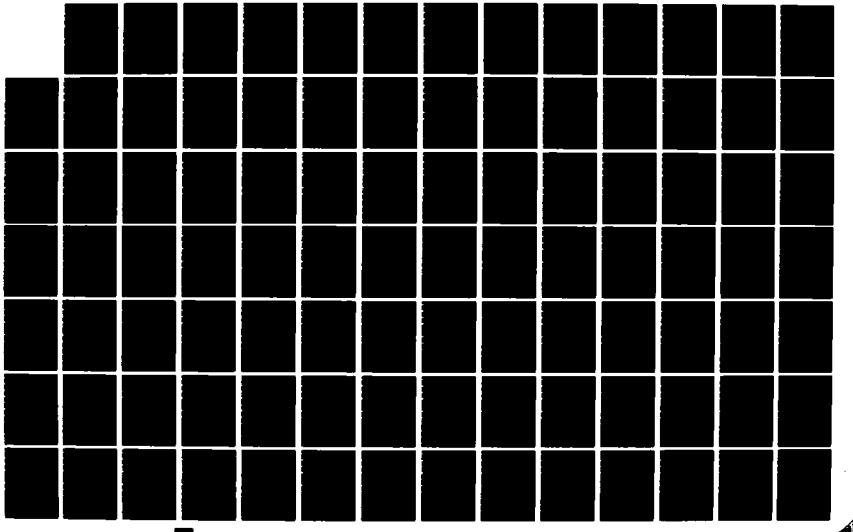
Test Procedure: Turn on test equipment. Set measurement equipment to proper ranges. Apply input signal to S-Parameter Test Set from Sweep Generator. Measure VSWR and impedance with Network Analyzer. (Repeat for all 5 17F(IF) outputs)

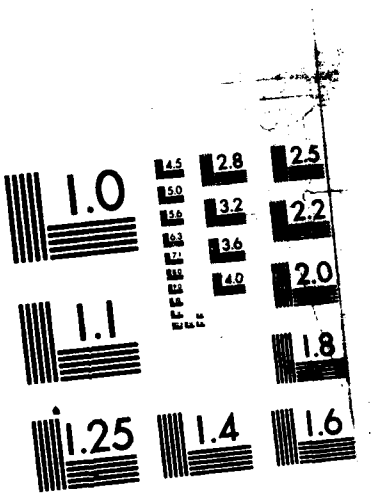
Data Reduction: Send input levels to printer. Output of Network Analyzer to plotter.

Equipment List:

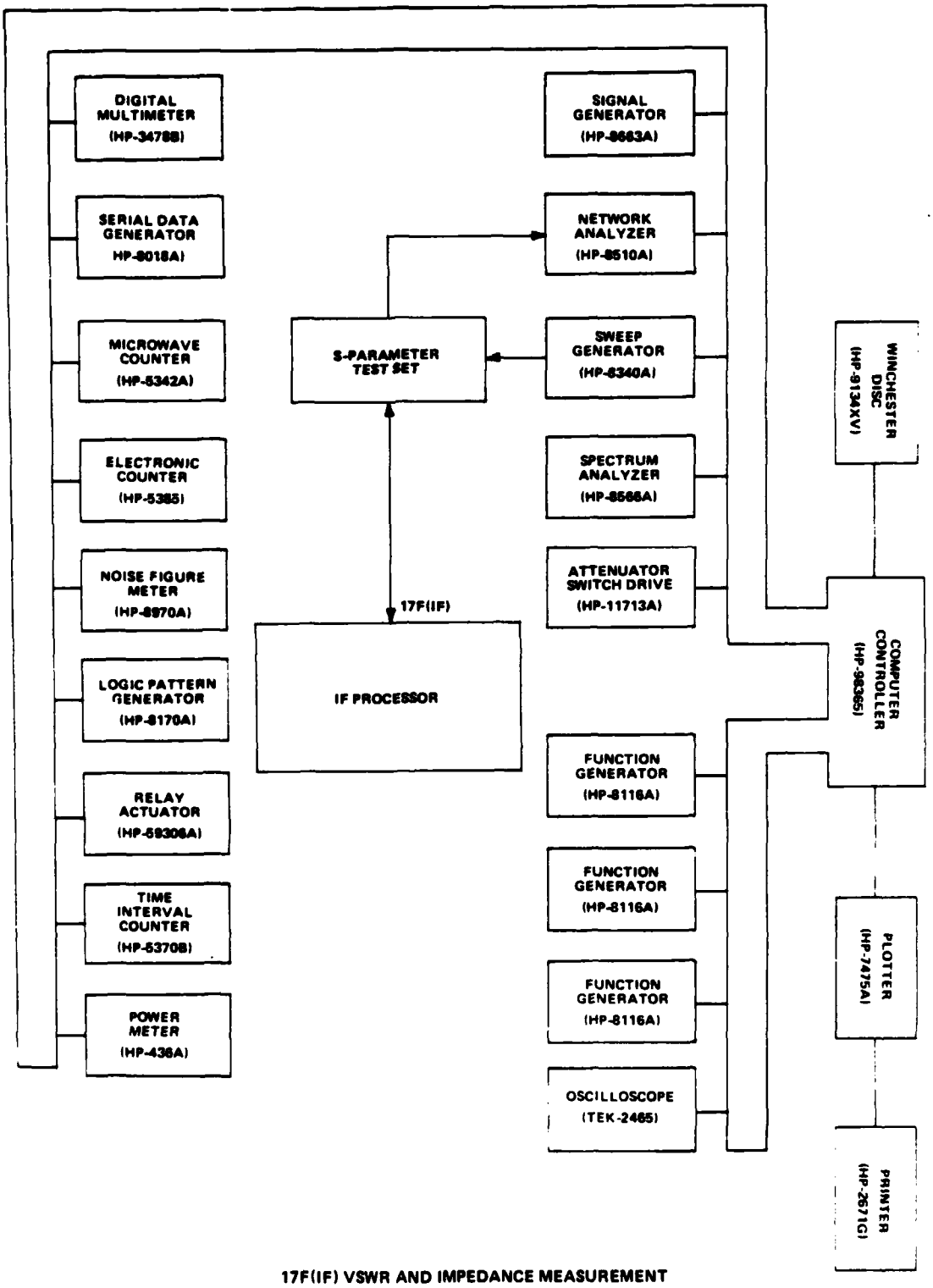
1.	Computer (HP-9836S)	4.	S-Par Test Set (HP-8515A)	7.	
2.	Printer (HP-2671G)	5.	Network Anal. (HP-8510A)	8.	
3.	Plotter (HP-7475A)	6.	Sweep Gen. (HP-8340A)	9.	

AD-A166 498 UE BENCH TEST PLANS AND REQUIREMENTS VOLUME 2 2/3
ROCKWELL-COLLINS UE SET(U) ESSCUBE ENGINEERING INC
MARLTON NJ SEP 84 CEA/GPS-85-156-00-030-VOL-2
UNCLASSIFIED N62269-82-D-0059 F/G 14/2 NL





MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS 1963 A



17F(IF) VSWR AND IMPEDANCE MEASUREMENT

Contractor: Rockwell-Collins

Board Tested: IF Processor

Test Objective: Measure noise figure of 17F(IF) outputs.

Inputs

	Input Name	Input Level	Equipment Used
1.	Switch Select Input 1	TBD	Logic Patt. Gen. (HP-8170A)
2.	Switch Select Input 2	TBD	Logic Patt. Gen. (HP-8170A)
3.	Switch Select Input 3	TBD	Logic Patt. Gen. (HP-8170A)
4.	Switch Select Input 4	TBD	Logic Patt. Gen. (HP-8170A)
5.	Switch Select Input 5	TBD	Logic Patt. Gen. (HP-8170A)
6.	L1 BIT Control	TBD	Logic Patt. Gen. (HP-8170A)
7.	L2 BIT Control	TBD	Logic Patt. Gen. (HP-8170A)
8.	Noise Diode Control	TBD	Logic Patt. Gen. (HP-8170A)
9.	BIT Fo	TBD	Function Generator (HP-8116A)
10.	BIT Code	TBD	* In-House Generator
11.	L1 Coax	TBD	Noise Source (HP-346B)
12.	L2 Coax	TBD	Noise Source (HP-346B)
13.	(137/4) Fo	350.3775MHz @ TBD	Sweep Generator (HP-8340A)

* In-House designed P-Code Generator (may also need C/A Code Generator)

Outputs

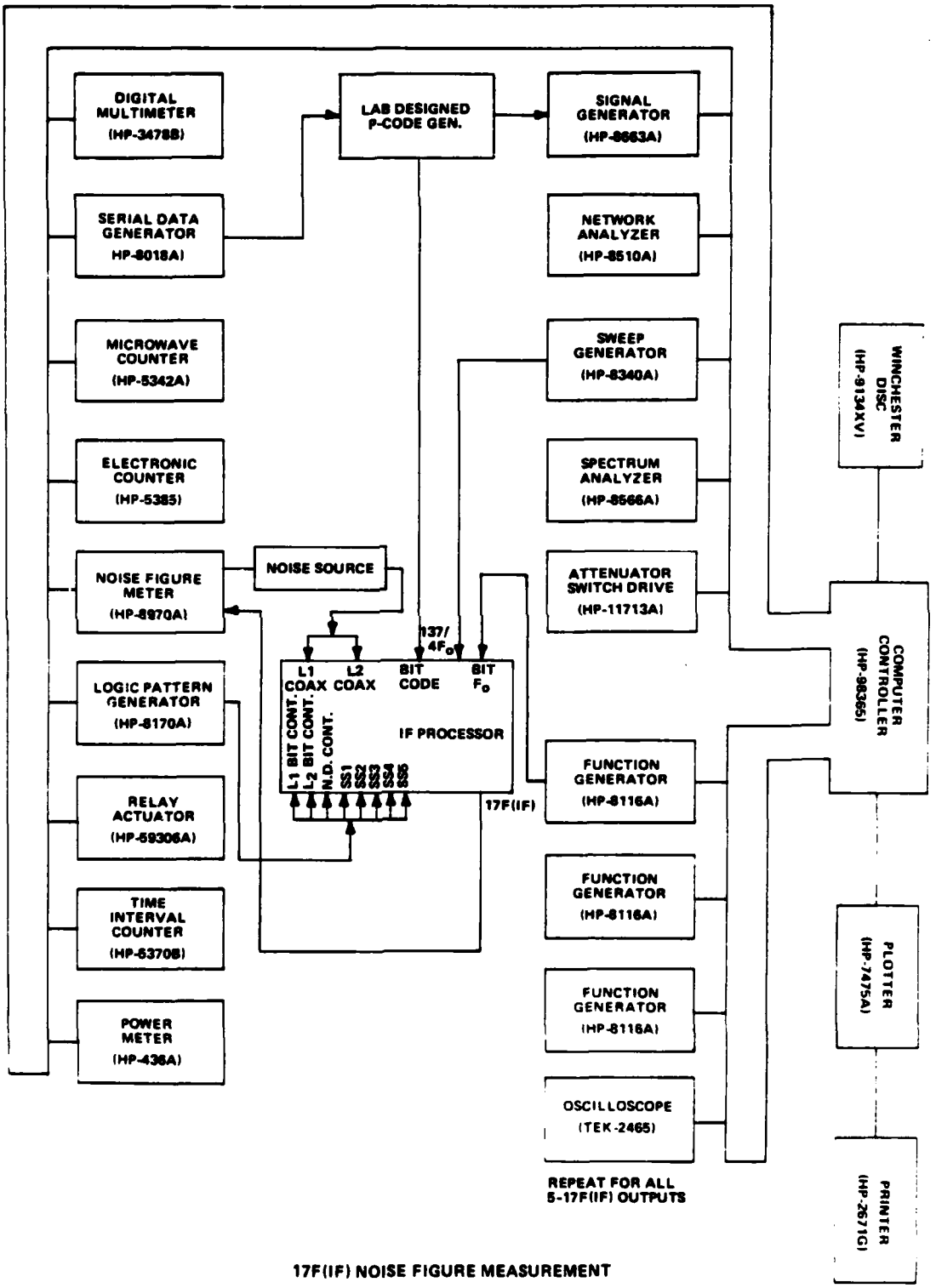
	Output Name	Output Level	Equipment Used
1.	17F(IF)	TBD	Noise Figure Meter (HP-8970A)
2.			
3.			
4.			
5.			

Test Procedure: Turn on test equipment. Set measurement equipment to proper ranges. Apply proper signal levels to all inputs. Turn on noise source. Measure noise figure with Noise Figure Meter. (Repeat for all 5 17F(IF) outputs)

Data Reduction: Send input levels and output of Noise Figure Meter to printer.

Equipment List:

1.	Computer (HP-9836S)	4.	Ser. Data Gen. (HP-8018A)	7.	Signal Gen. (HP-8663A)
2.	Printer (HP-2671G)	5.	Sweep Gen. (HP-8340A)	8.	In House Design
3.	Logic Patt Gen (HP-8170A)	6.	Function Gen. (HP-8116A)	9.	Noise Source (HP-346B)
10.	Noise Fig. Meter (HP-8970A)				



17F(IF) NOISE FIGURE MEASUREMENT

3.1.1.5 REFERENCE OSCILLATOR MODULE

Contractor: Rockwell-Collins

Board Tested: Reference Oscillator

Test Objective: Measure output frequency

Inputs

	Input Name	Input Level	Equipment Used
1.	DC Input	8.25VDC	Function Gen. (HP-8116A)
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			

Outputs

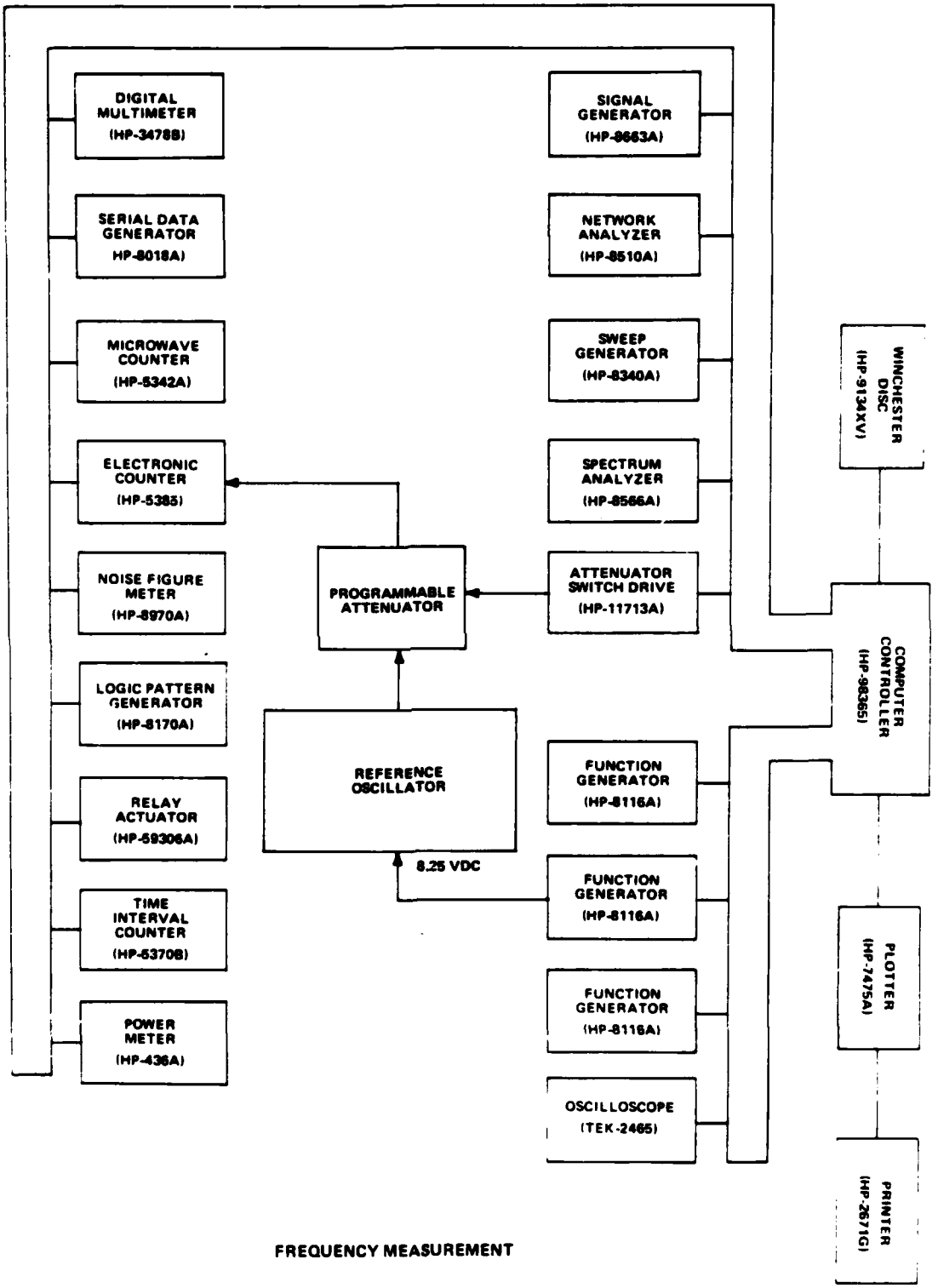
	Output Name	Output Level	Equipment Used
1.	Fo	10.23MHz	Electronic Ctr. (HP-5385)
2.			Att. Sw Drive (HP-11713A)
3.			Prog. Att. (HP-8494G)
4.			
5.			

Test Procedure: Turn on test equipment. Set measurement equipment to proper ranges. Apply a DC Voltage to input of Reference Oscillator. Measure output frequency with Electronic Counter.

Data Reduction: Send input levels and output of Electronic Counter to printer.

Equipment List:

1.	Computer (HP-9836S)	4.	Electronic Ctr. (HP-5385)	7.	
2.	Printer (HP-2671G)	5.	Att Sw Dr. (HP-11713A)	8.	
3.	Function Gen. (HP-8116A)	6.	Prog. Att. (HP-8494G)	9.	



FREQUENCY MEASUREMENT

Contractor: Rockwell-Collins

Board Tested: Reference Oscillator

Test Objective: Measure output power

Inputs

	Input Name	Input Level	Equipment Used
1.	DC Input	8.25VDC	Function Gen. (HP-8116A)
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			

Outputs

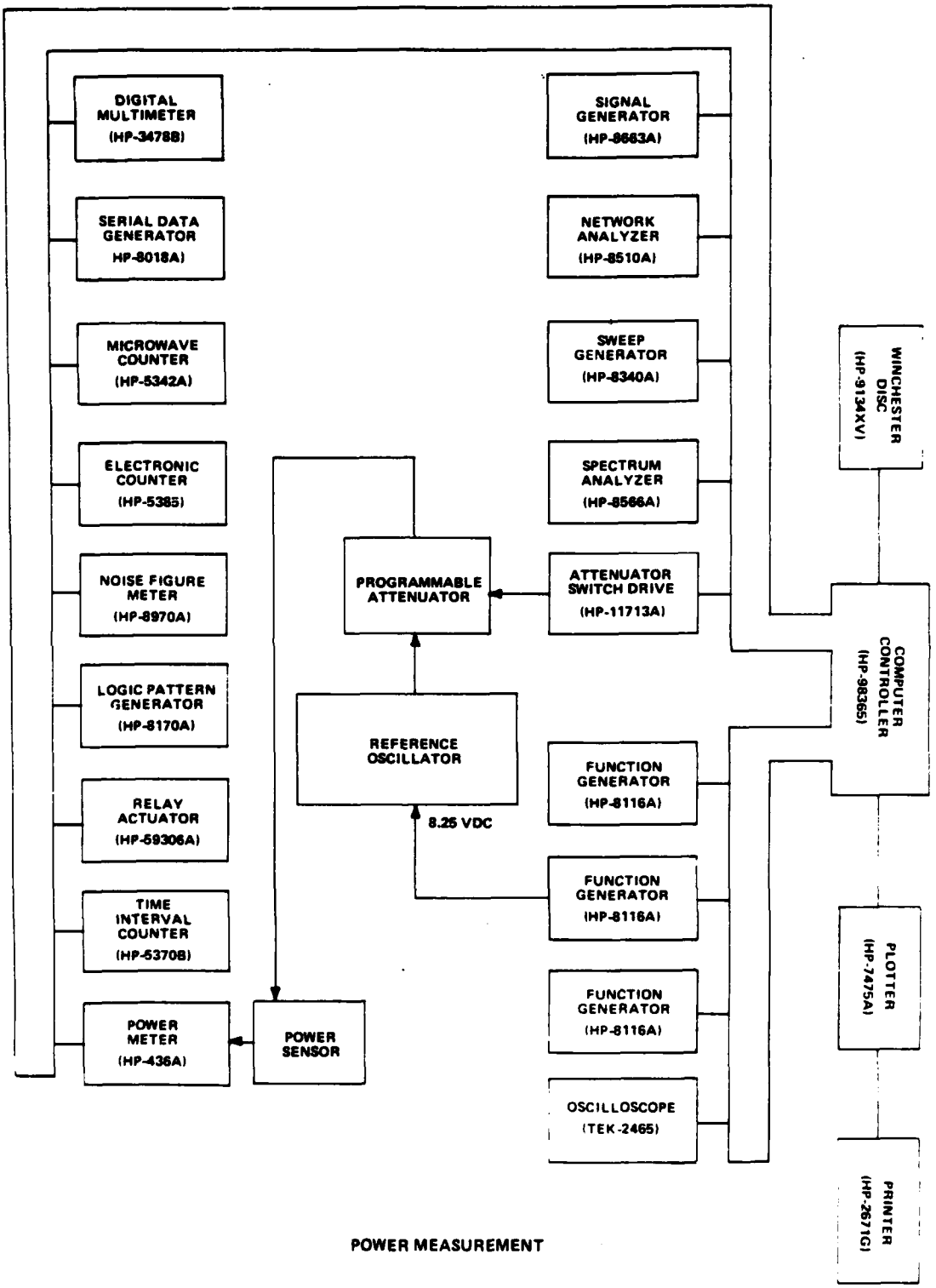
	Output Name	Output Level	Equipment Used
1.	Fo	0dBm	Power Meter (HP-436A)
2.			Power Sensor (HP-8481A)
3.			Att. Sw Drive (HP-11713A)
4.			Prog. Att. (HP-8494G)
5.			

Test Procedure: Turn on test equipment. Set measurement equipment to proper ranges. Apply a DC voltage to input of Reference Oscillator. Measure output power with Power Meter.

Data Reduction: Send input levels and output of Power Meter to printer.

Equipment List:

1.	Computer (HP-9836S)	4.	Power Meter (HP-436A)	7.	Prog. Att. (HP-8494G)
2.	Printer (HP-2671G)	5.	Power Sensor (HP-8481G)	8.	
3.	Func. Gen. (HP-8116A)	6.	Att. Sw Dr. (HP-11713A)	9.	



POWER MEASUREMENT

Contractor: Rockwell-Collins

Board Tested: Reference Oscillator

Test Objective: Measure spectral content of output signal.

Inputs

	Input Name	Input Level	Equipment Used
1.	DC Input	8.25VDC	Function Gen. (HP-8116A)
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			

Outputs

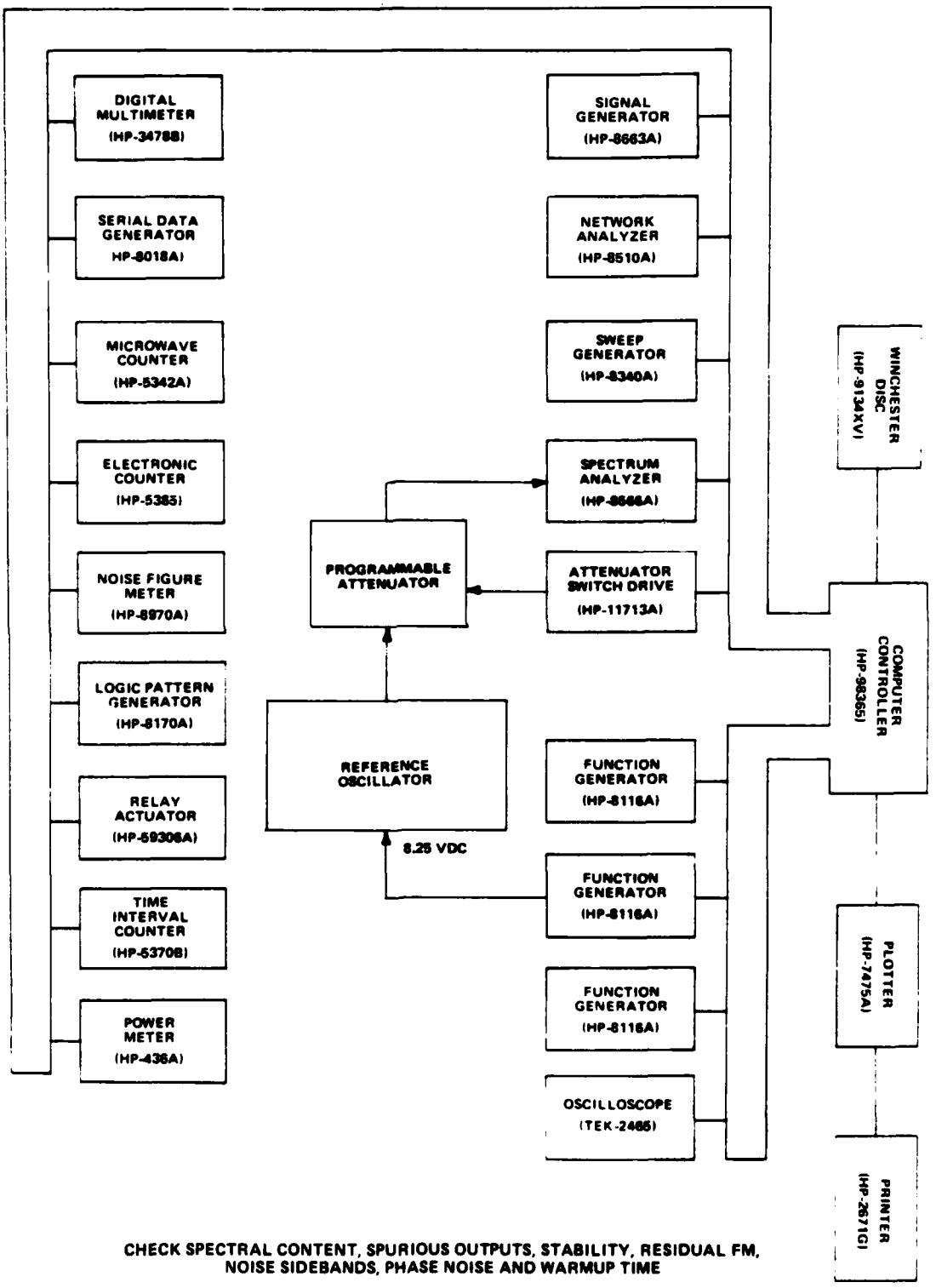
	Output Name	Output Level	Equipment Used
1.	Fo	10.23MHz @ 0dBm	Spectrum Anal. (HP-8566A)
2.			Att. Sw Drive (HP-11713A)
3.			Prog. Att. (HP-8494G)
4.			
5.			

Test Procedure: Turn on test equipment. Set measurement equipment to proper ranges. Apply a DC Voltage to input of Reference Oscillator. Measure spectral content of output signal with Spectrum Analyzer.

Data Reduction: Send input level to printer. Output of Spectrum Analyzer to plotter.

Equipment List:

1.	Computer (HP-9836S)	4.	Spectrum Anal. (HP-8566A)	7.	Plotter (HP-7475A)
2.	Printer (HP-2671G)	5.	Att. Sw Dr. (HP-11713A)	8.	
3.	Function Gen. (HP-8116A)	6.	Prog. Att. (HP-8494G)	9.	



CHECK SPECTRAL CONTENT, SPURIOUS OUTPUTS, STABILITY, RESIDUAL FM, NOISE SIDEBANDS, PHASE NOISE AND WARMUP TIME

Contractor: Rockwell-Collins

Board Tested: Reference Oscillator

Test Objective: Check oscillator output for stability, residual FM, noise sidebands and phase noise.

Inputs

	Input Name	Input Level	Equipment Used
1.	DC Input	8.25VDC	Function Gen. (HP-8116A)
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			

Outputs

	Output Name	Output Level	Equipment Used
1.	Fo	TBD	Spectrum Anal. (HP-8566A)
2.			Att. Sw Drive (HP-11713A)
3.			Prog. Att. (HP-8494G)
4.			
5.			

Test Procedure: Turn on test equipment. Set measurement equipment to proper ranges. Apply a DC Voltage to input of Reference Oscillator. Measure short and long term stability, phase noise, noise sidebands, and residual FM at oscillator output.

Data Reduction: Send input levels to printer. Output of Spectrum Analyzer to plotter.

Equipment List:

1.	Computer (HP-9836S)	4.	Plotter (HP-7475A)	7.	Prog. Att. (HP-8494G)
2.	Printer (HP-2671G)	5.	Spectrum Anal. (HP-8566A)	8.	
3.	Function Gen. (HP-8116A)	6.	Att. Sw Dr. (HP-11713A)	9.	

Contractor: Rockwell-Collins

Board Tested: Reference Oscillator

Test Objective: Verify within specification operation of oscillator after 5 minute warm-up.

Inputs

	Input Name	Input Level	Equipment Used
1.	DC Input	8.25VDC	Function Gen. (HP-8116A)
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			

Outputs

	Output Name	Output Level	Equipment Used
1.	Fo	-----	Spectrum Anal. (HP-8566A)
2.			Att. Sw Dr. (HP-11713A)
3.			Prog. Att. (HP-8494G)
4.			
5.			

Test Procedure: Turn on test equipment. Set measurement equipment to proper ranges. Apply a DC Voltage to input of Reference Oscillator. After 5 minute specification period, take stability reading with Spectrum Analyzer to verify proper operation after the warm up period.

Data Reduction: Send input level to printer. Output of Spectrum Analyzer to plotter.

Equipment List:

1.	Computer (HP-9836S)	4.	Plotter (HP-7475A)	7.	Prog. Att. (HP-8494G)
2.	Printer (HP-2671G)	5.	Spectrum Anal. (HP-8566A)	8.	
3.	Function Gen. (HP-8116A)	6.	Att. Sw Dr. (HP-11713A)	9.	

Contractor: Rockwell-Collins

Board Tested: Reference Oscillator

Test Objective: Verify Standard Fault operation.

Inputs

	Input Name	Input Level	Equipment Used
1.	DC Input	8.25VDC	Function Gen. (HP-8116A)
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			

Outputs

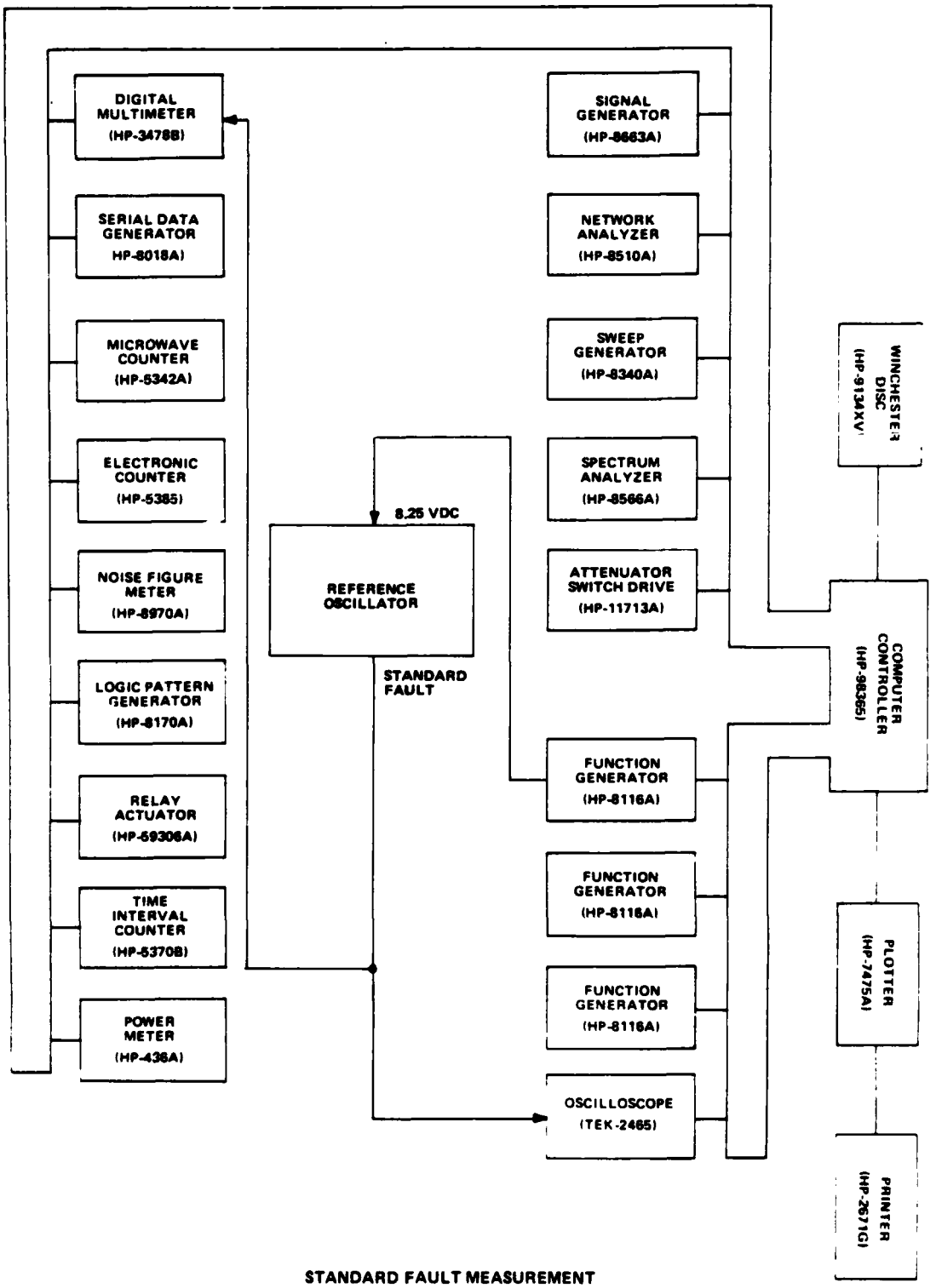
	Output Name	Output Level	Equipment Used
1.	Standard Fault output	TBD	Digital Multi. (HP-3478B)
2.			Oscilloscope (HP-2465)
3.			
4.			
5.			

Test Procedure: Turn on test equipment. Set measurement equipment to proper ranges. Apply a DC Voltage to Reference Oscillator input. Measure Standard Fault output with Digital Multimeter. An Oscilloscope will be used to display waveform.

Data Reduction: Send input level and output of Digital Multimeter to printer. Output of Oscilloscope to plotter.

Equipment List:

1.	Computer (HP-9836S)	4.	Digital Multi. (HP-3487B)	7.	
2.	Printer (HP-2671G)	5.	Oscilloscope (TEK-2465)	8.	
3.	Function Gen. (HP-8116A)	6.	Plotter (HP-7475A)	9.	



STANDARD FAULT MEASUREMENT

3.1.1.6 ANTENNA ELECTRONICS

Contractor: Rockwell-Collins

Board Tested: Antenna Electronics

Test Objective: To ensure that the L1 and L2 IF interfaces of the AE are AC coupled (DC Impedance)

Inputs

	Input Name	Input Level	Equipment Used
1.	Digital Controls	TBD	TBD
2.	---	---	---
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			

Outputs

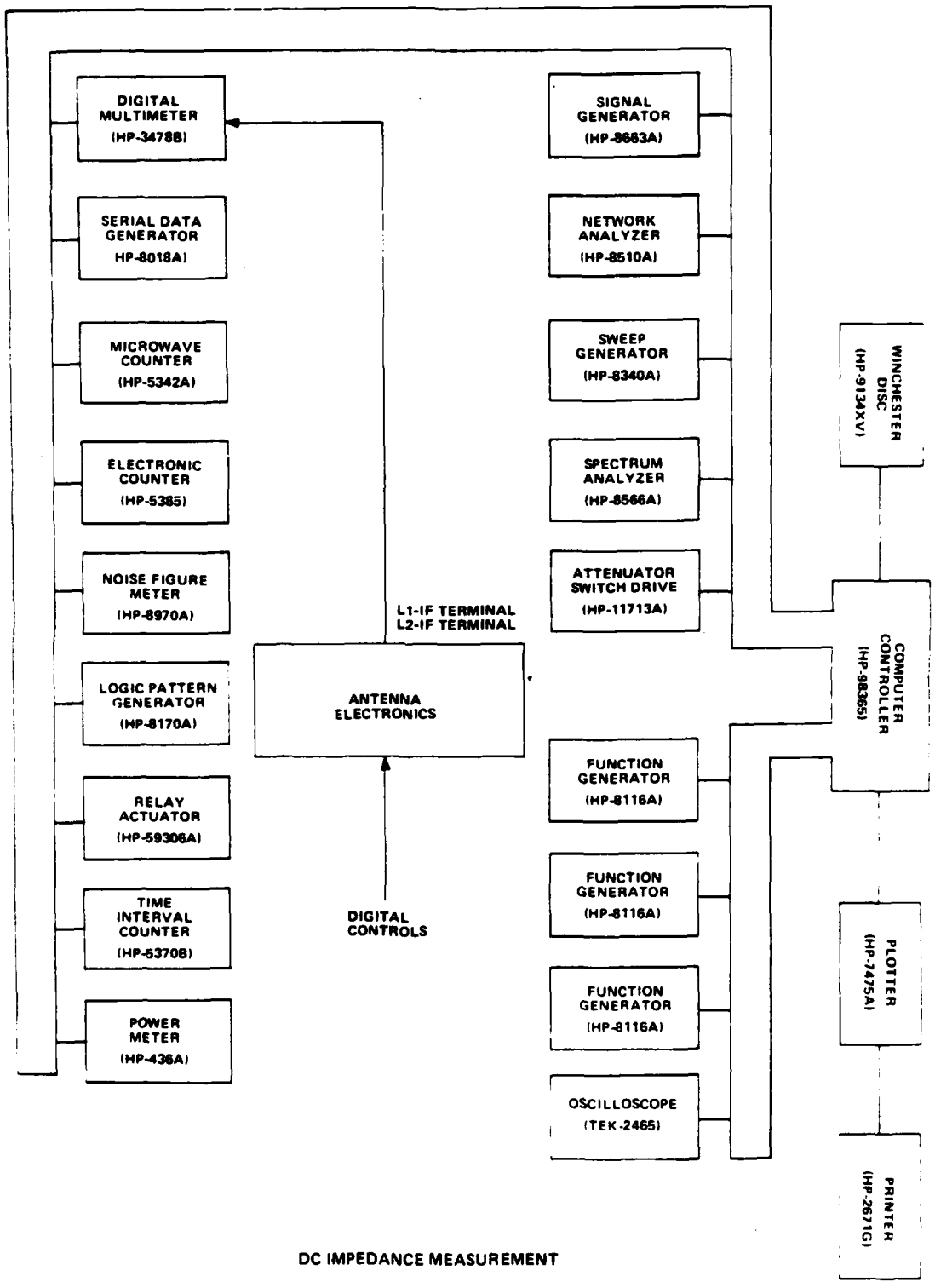
	Output Name	Output Level	Equipment Used
1.	L2 IF	>100kΩ	Digital Multi (HP-3478B)
2.	L1 IF	>100kΩ	Digital Multi (HP-3478B)
3.			
4.			
5.			

Test Procedure: Turn on test equipment. Set measurement equipment to proper ranges. Connect the Digital Multimeter across the L2 IF terminal. A DC impedance greater than 100kΩ will indicate that the interface is AC coupled only. Repeat for L1.

Data Reduction: Send input levels and output of Digital Multimeter to printer.

Equipment List:

1.	Computer (HP-9836S)	4.		7.	
2.	Printer (HP-2671G)	5.		8.	
3.	Digital Multimeter (HP-3478B)	6.		9.	



DC IMPEDANCE MEASUREMENT

Contractor: Rockwell-Collins

Board Tested: Antenna Electronics

Test Objective: Verify that input impedance is not less than 2k ohms resistive. (Blanking Pulse Input Impedance)

Inputs

	Input Name	Input Level	Equipment Used
1.	Blanking Pulse Input Z	2kΩ minimum	Digital Multi. (HP-3478B)
2.	Digital Controls	TBD	TBD
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			

Outputs

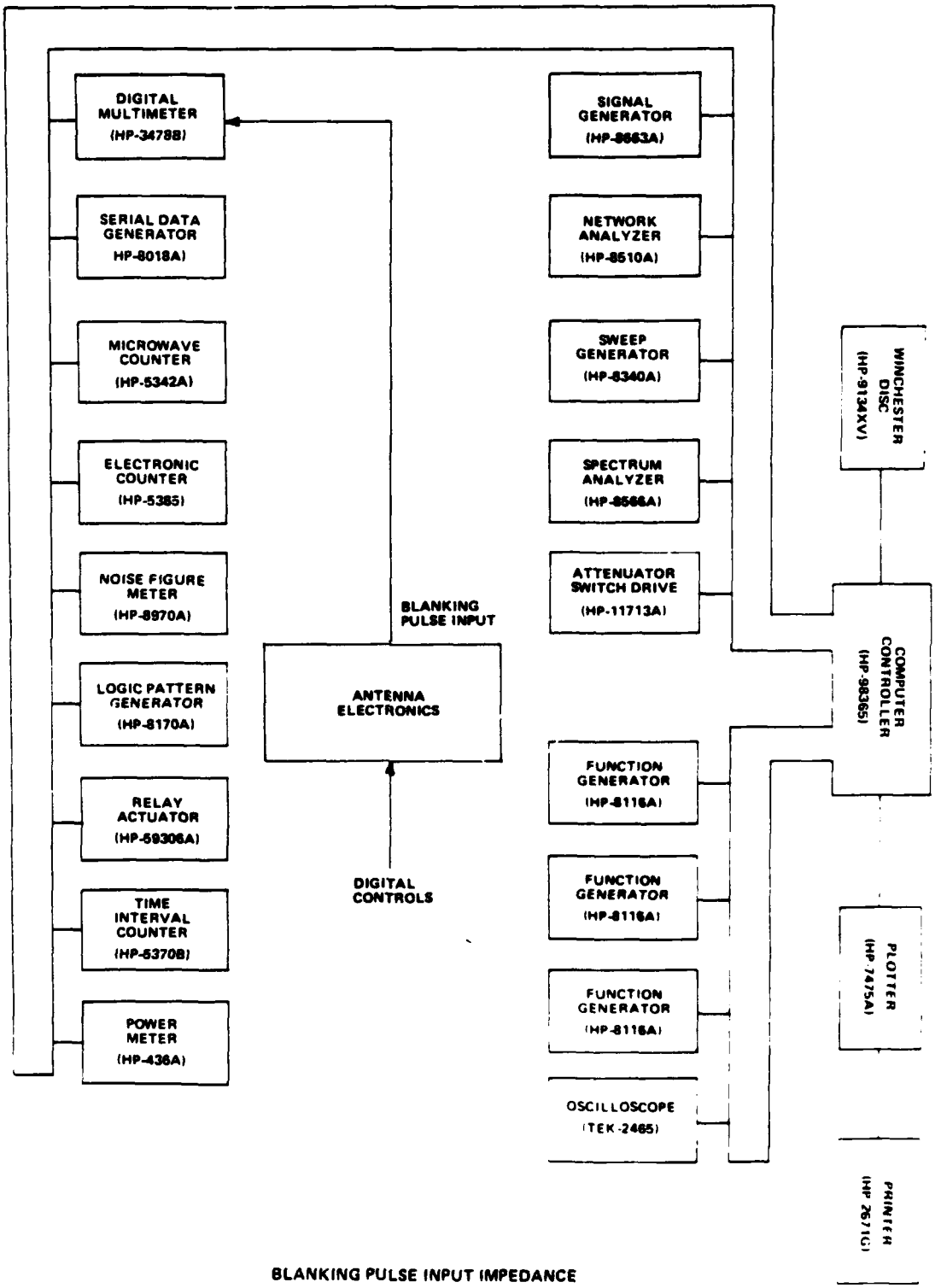
	Output Name	Output Level	Equipment Used
1.	---	---	---
2.			
3.			
4.			
5.			

Test Procedure: Turn on test equipment. Set measurement equipment to proper ranges. Insert the Digital Multimeter across the Blanking Pulse Input Terminal. Measure resistance.

Data Reduction: Send input levels and output of Digital Multimeter to printer.

Equipment List:

1.	Computer (HP-9836S)	4.		7.	
2.	Printer (HP-2671G)	5.		8.	
3.	Digital Multi. (HP-3478B)	6.		9.	



BLANKING PULSE INPUT IMPEDANCE

Contractor: Rockwell-Collins

Board Tested: Antenna Electronics

Test Objective: To verify that the AE does not exceed its specified power consumption. (Power Consumption)

Inputs

	Input Name	Input Level	Equipment Used
1.	Main Power	115VAC/400Hz/1-Phase	External Source
2.	Digital Controls	TBD	TBD
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			

Outputs

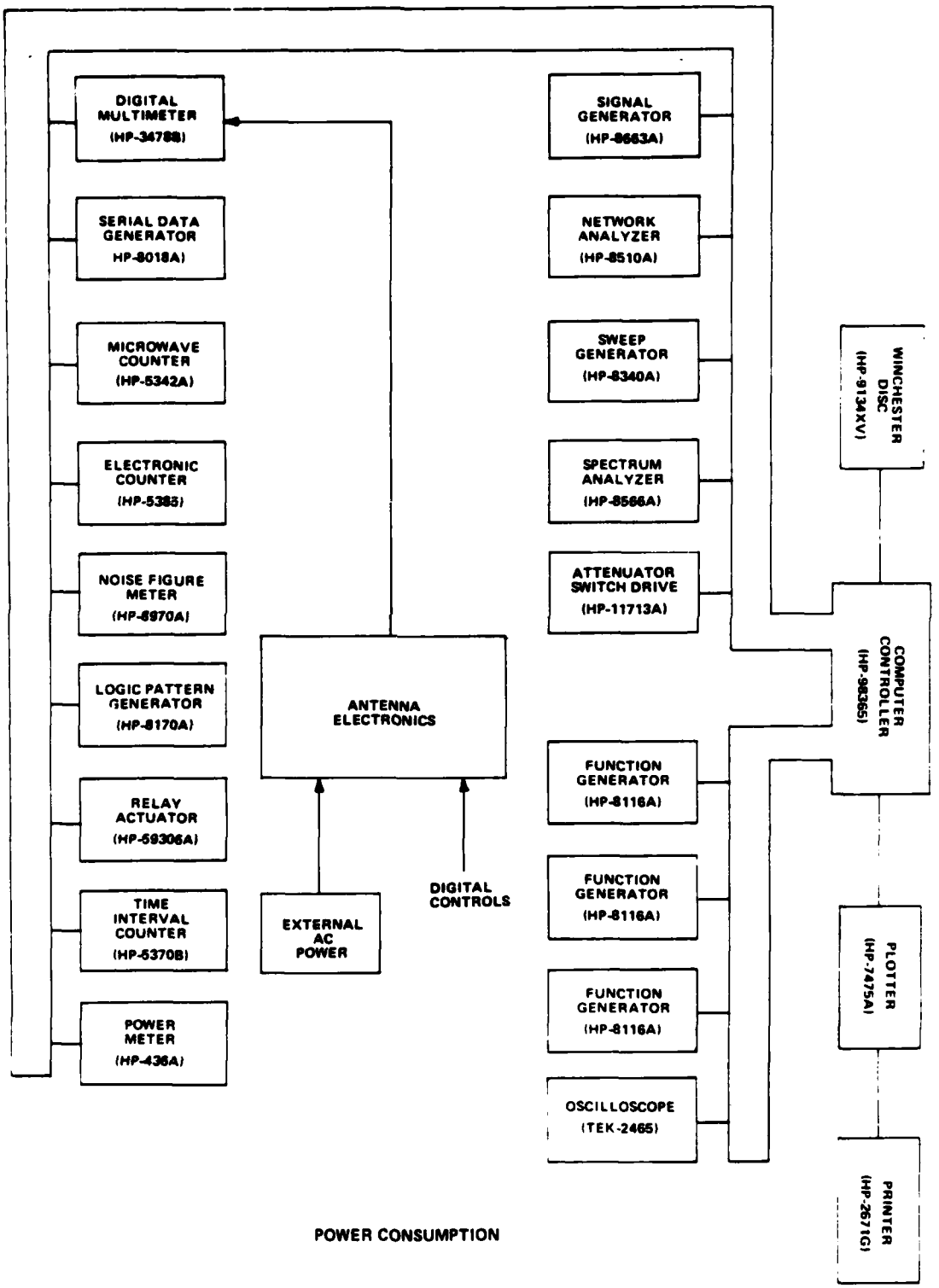
	Output Name	Output Level	Equipment Used
1.	Main power line current & line voltage	22 watts (max.)	Digital Multi. (HP-3478B)
2.			
3.			
4.			
5.			

Test Procedure: Turn on test equipment. Set measurement equipment to proper ranges. Measure current in main power line and line voltage with Digital Multimeter.

Data Reduction: Send output of Digital Multimeter to printer. Power calculation (P=VI).

Equipment List:

1.	Computer (HP-9836S)	4.	Ext. AC Source	7.	
2.	Printer (HP-2671G)	5.		8.	
3.	Digital Multi. (HP-3478B)			9.	



POWER CONSUMPTION

Contractor: Rockwell-Collins

Board Tested: Antenna Electronics

Test Objective: To verify that the VSWR at all of the AE inputs is within specification. (Input VSWR)

Inputs

	Input Name	Input Level	Equipment Used
1.	S-Par Test Set	L1 (1565.42 to 1585.42)MHz @ -45dBm	Sweep Gen. (HP-8340A)
2.	S-Par Test Set	L2 (1217.6 to 1237.6)MHz @ -45dBm	Sweep Gen. (HP-8340A)
3.	S-Par Test Set	fc = 350MHz @ -45dBm	Sweep Gen. (HP-8340A)
4.	Digital Controls	TBD	TBD
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			

Outputs

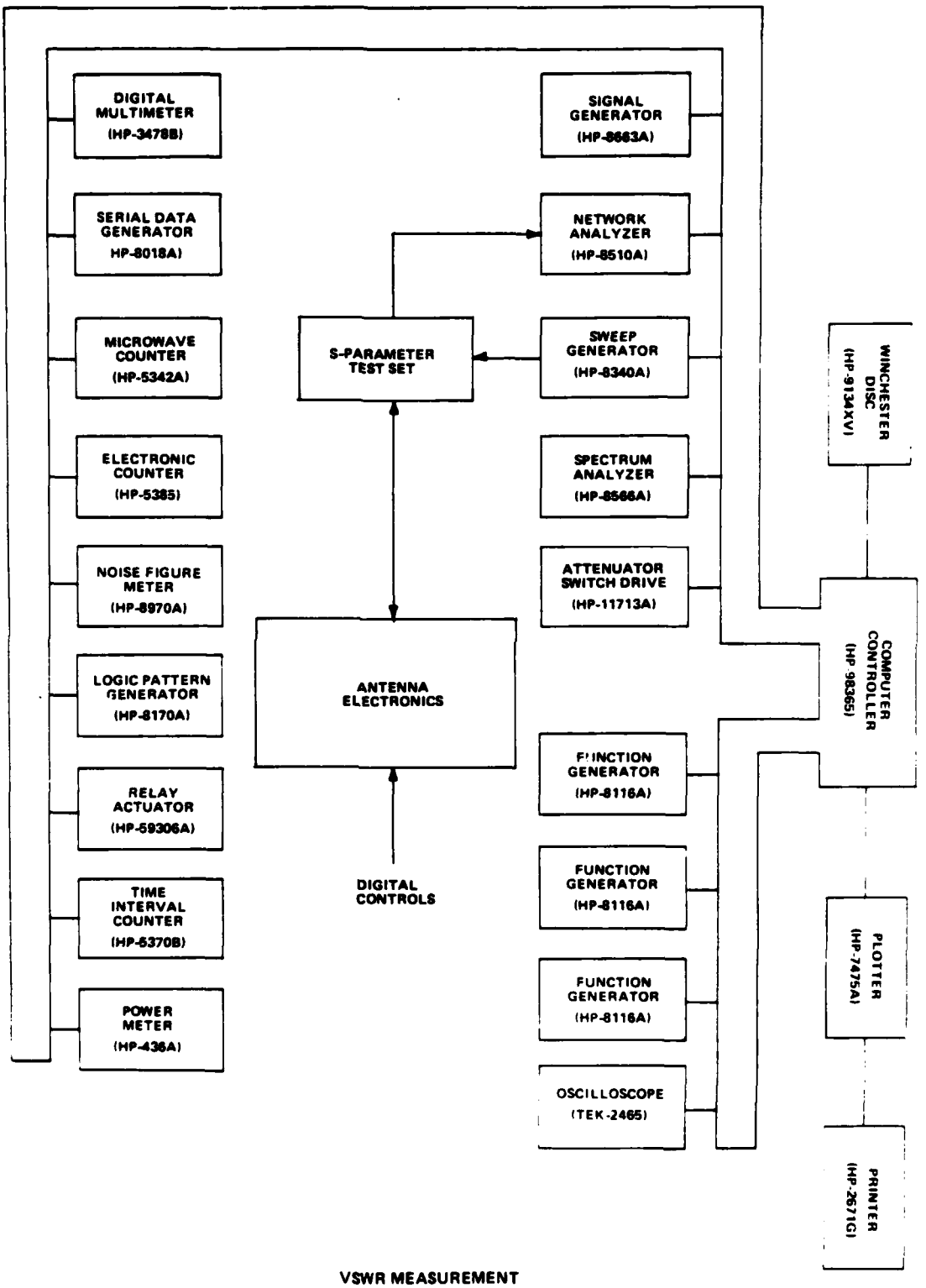
	Output Name	Output Level	Equipment Used
1.	CRPA Ref. Input	VSWR= 1.5:1 (max.) (L1,L2)	Network Anal. (HP-8510A)
2.	CRPA Aux. Inputs (6)	VSWR= 1.5:1 (max.) (L1,L2)	S-Par Test Set (HP-8515A)
3.	BMFRPA Input	VSWR= 1.5:1 (max.) (L1,L2)	
4.	LO Input (L1 IF)	VSWR = 2.0:1 (max.)	
5.			

Test Procedure: Turn on test equipment. Set measurement equipment to proper ranges. The reference channel input of the AE will be connected to the test port of the S-Parameter Test Set. S11 (Input Reflection Coefficient) will be measured. Repeat for all other inputs.

Data Reduction: Data will be plotted on a Smith chart using the plotter. Inputs will be sent to printer.

Equipment List:

1.	Computer (HP-9836S)	4.	S-Par Test Set (HP-8515A)	7.	
2.	Printer (HP-2671G)	5.	Sweep Gen. (HP-8340A)	8.	
3.	Network Anal. (HP-8510A)	6.	Plotter (HP-7475A)	9.	



VSWR MEASUREMENT

Contractor: Rockwell-Collins

Board Tested: Antenna Electronics

Test Objective: To verify that the VSWR at all of the AE outputs is within specification. (Output VSWR)

Inputs

	Input Name	Input Level	Equipment Used
1.	S-Par Test Set	L1IF(164MHz to 184MHz) @-45dBm	Sweep Gen. (HP-8340A)
2.	S-Par Test Set	L2IF(164MHz to 184MHz) @-45dBm	Sweep Gen. (HP-8340A)
3.	Digital Controls	TBD	TBD
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			

Outputs

	Output Name	Output Level	Equipment Used
1.	L1 IF output	VSWR = 1.5:1 (max.)	Network Anal. (HP-8510A)
2.	L2 IF output	VSWR = 1.5:1 (max.)	S-Par Test Set (HP-8515A
3.	MCR output	VSWR = 2.0:1 (max.)	
4.			
5.			

Test Procedure: Turn on test equipment. Set measurement equipment to proper ranges. The L1 IF output will be connected to the test port of the S-Parameter test set. S22 (Output Reflect Coefficient) will be recorded. Repeat for all other outputs.

Data Reduction: Data will be plotted on a Smith Chart using the plotter. Inputs will be recorded on printer.

Equipment List:

1.	Computer (HP-9836S)	4.	S-Par Test Set (HP-8515A)	7.	
2.	Printer (HP-2671G)	5.	Network Anal. (HP-8510A)	8.	
3.	Sweep Gen. (HP-8340A)	6.	Plotter (HP-7475A)	9.	

Contractor: Rockwell-Collins

Board Tested: Antenna Electronics

Test Objective: To verify that the gain of the AE from the CRPA reference channel input to either IF output as well as the MCR output, and the gain from the BMFRPA input to either IF output is as specified. (Gain)

Inputs

	Input Name	Input Level	Equipment Used
1.	CRPA Ref. Channel Input	L1(1565.42 to 1585.42MHz) @ -45dBm	Sweep Gen. (HP-8340A)
2.	CRPA Ref. Input	L2(1217.6 to 1237.6MHz) @ -45dBm	Sweep Gen. (HP-8340A)
3.	BMFRPA Input	L1(1565.42 to 1585.42MHz) @ -45dBm	Sweep Gen. (HP-8340A)
4.	BMFRPA Input	L2(1217.6 to 1237.6MHz) @ -45dBm	Sweep Gen. (HP-8340A)
5.	*Digital Controls	TBD	TBD
6.			
7.			
8.			
9.			
10.			
11.			
12.			

* (May need LO Source (Signal Generator HP-8663A)) (350MHz)

Outputs

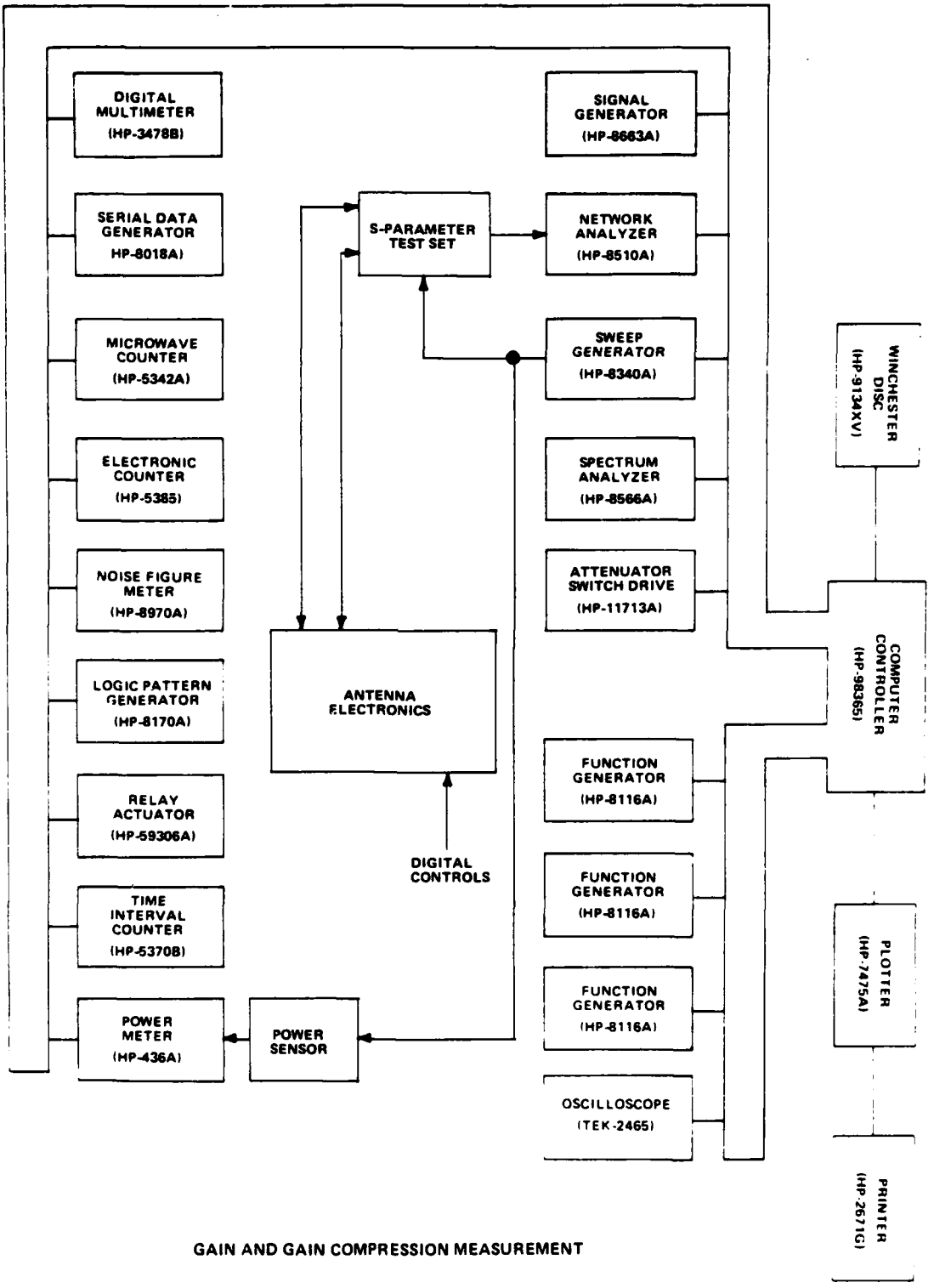
	Output Name	Output Level	Equipment Used
1.	CRPA Ref. to MCR Output for L1 & L2	17dB ±5dB	Network Anal. (HP-8510A)
2.	CRPA Ref. to L1 IF Output for L1 & L2	38 ±5dB	S-Par Test Set (HP-8515A)
3.	BMFRPA to L1-IF Output	38 ±5dB	
4.			
5.			

Test Procedure: Turn on test equipment. Set measurement equipment to proper ranges. The AE will be connected to the Network Analyzer. Input power to the AE will be -40dBm ±5dB. The passband response will be measured at L1 between the CRPA reference channel input and the IF and MCR outputs; and the bottom mounted FRPA input and IF outputs. Repeat for L2, with proper digital control signals applied.

Data Reduction: Send output of Network Analyzer to plotter and send inputs to printer. Read GAIN from passband response recorded on plotter.

Equipment List:

1.	Computer (HP-9836S)	4.	Plotter (HP-7475A)	7.	S-Par Test Set (HP-8515A)
2.	Printer (HP-2671G)	5.	Power Sensor (HP-8481A)	8.	Network Anal. (HP-8510A)
3.	Sweep Gen. (HP-8340A)	6.	Power Meter (HP-436A)	9.	



GAIN AND GAIN COMPRESSION MEASUREMENT

Contractor: Rockwell-Collins

Board Tested: Antenna Electronics

Test Objective: To verify that the AE exhibits less than specified amount of Gain Compression at the IF output with an input signal of -33dBm. (Gain Compression)

Inputs

	Input Name	Input Level	Equipment Used
1.	CRPA Ref, Channel Input	L1(1565.42 to 1585.42MHz) @ -33dBm ±.1	Sweep Gen. (HP-8340A)
2.	CRPA Ref. Input	L2(1217.6 to 1237.6MHz) @ -33dBm ±.1	Sweep Gen. (HP-8340A)
3.	BMFRPA Input	L1(1565.42 to 1585.42MHz) @ -33dBm ±.1	Sweep Gen. (HP-8340A)
4.	BMFRPA Input	L2(1217.6 to 1237.6MHz) @ -33dBm ±.1	Sweep Gen. (HP-8340A)
5.	*Digital Controls	TBD	TBD
6.			
7.			
8.			
9.			
10.			
11.			
12.			

* (May need LO source (Signal Generator HP-8663A)) (350MHz)

Outputs

	Output Name	Output Level	Equipment Used
1.	L1 IF Output	±1dB	Network Anal. (HP-8510A)
2.	L2 IF Output	±1dB	S-Par Test Set (HP-8515A)
3.	MCR Output	±1dB	
4.			
5.			

Test Procedure: Turn on test equipment. Set measurement equipment to proper ranges. An input power level at the CRPA reference channel input will be set at -33dBm. The AE will be connected to the Network Analyzer. The passband response will be measured at L1 between the CRPA reference channel input and the IF and MCR outputs; and the passband response will be measured at L1 between the BMFRPA input and the IF output. Repeat for L2.

Data Reduction: Send output of Network Analyzer to plotter and send inputs to printer. Read GAIN from passband response recorded on plotter. Compare results of this test with results of the GAIN test to determine GAIN compression. (±1dB)

Equipment List:

1.	Computer (HP-9836S)	4.	Plotter (HP-7475A)	7.	Network Anal. (HP-8510A)
2.	Printer (HP-2671G)	5.	Power Sensor (HP-8481A)	8.	S-Par Test Set (HP-8515A)
3.	Sweep Gen. (HP-8340A)	6.	Power Meter (HP-436A)	9.	

Contractor: Rockwell-Collins

Board Tested: Antenna Electronics

Test Objective: To demonstrate that L1 RF and L2 RF are down converted to the common IF and output to their respective ports. (RF Frequency Conversion)

Inputs

	Input Name	Input Level	Equipment Used
1.	CRPA Ref. Channel	1575.42 ±10MHz	Signal Gen. (HP-8663A)
2.	CRPA Ref. Channel	1227.6 ±10MHz	Signal Gen. (HP-8663A)
3.	LO Signal (L1 IF Port)	350MHz	Sweep Gen. (HP-8340A)
4.	Digital Controls	TBD	TBD
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			

Outputs

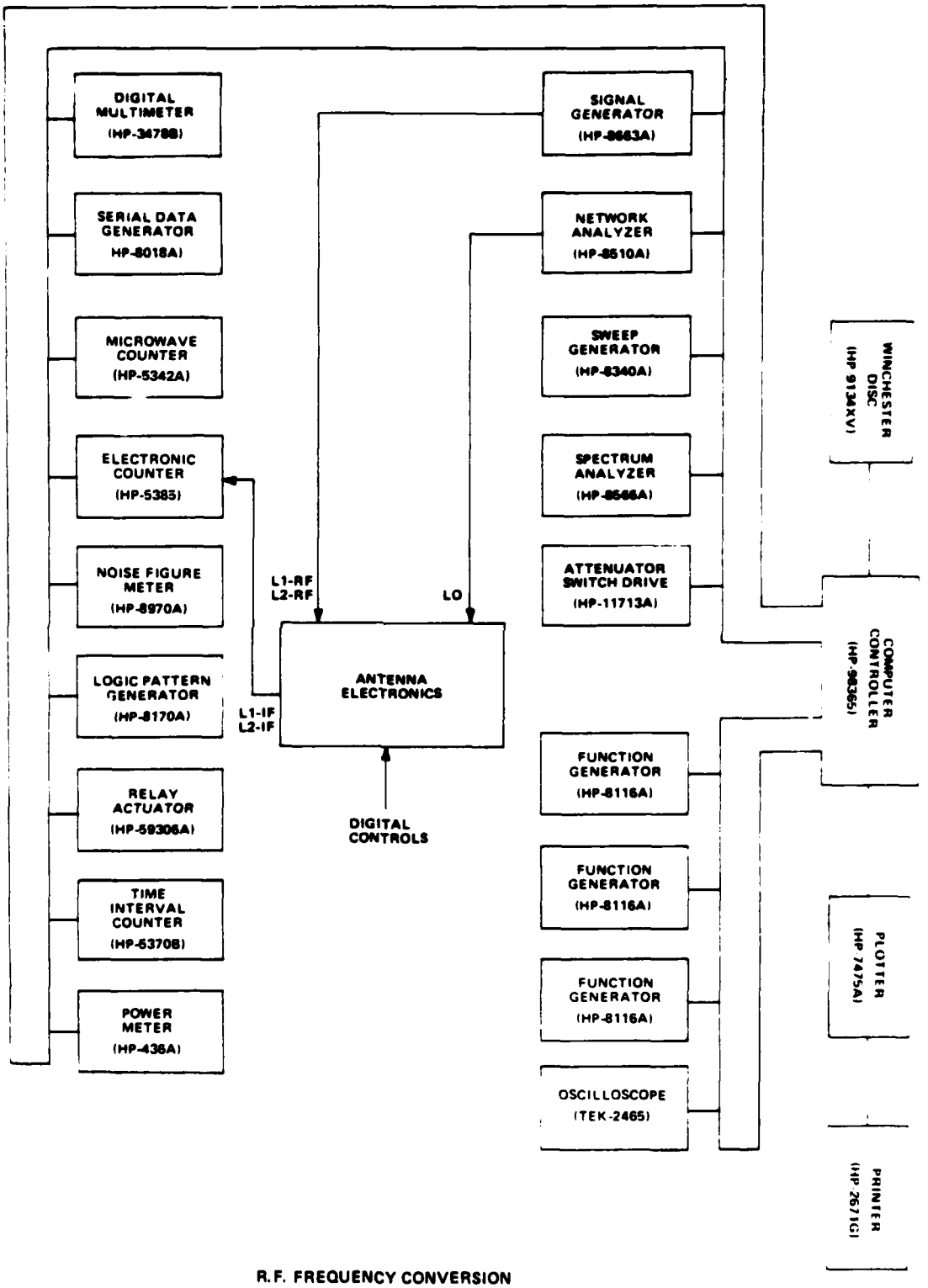
	Output Name	Output Level	Equipment Used
1.	L1 IF Output	174MHz ±.5MHz	Electronic Ctr (HP-5385)
2.	L2 IF Output	174MHz ±.5MHz	
3.			
4.			
5.			

Test Procedure: Turn on test equipment. Set measurement equipment to proper ranges. A L1 RF CW signal will be injected into the AE and the L1 IF output will be determined. The test will be repeated for L2 RF. Apply proper digital control signals.

Data Reduction: Send input levels and output of Electronic Counter to printer.

Equipment List:

1.	Computer (HP-9836S)	4.	Signal Gen. (HP-8663A)	7.	
2.	Printer (HP-2671G)	5.	Sweep Gen. (HP-8340A)	8.	
3.	Electronic Ctr (HP-5385)	6.		9.	



R.F. FREQUENCY CONVERSION

Contractor: Rockwell-Collins

Board Tested: Antenna Electronics

Test Objective: To verify the desired filter selectivity for the L1 and L2 IF outputs (channel selectivity filtering)

Inputs

	Input Name	Input Level	Equipment Used
1.	CRPA Ref Input	L1(1450.42 to 1700.42MHz) @ -45dBm	Sweep Gen. (HP-8340A)
2.	CRPA Ref Input	L2(1102.6 to 1352.6MHz) @ -45dBm	Microwave Ctr (HP-5342A)
3.			Power Sensor (HP-8481A)
4.			Power Meter (HP-436A)
5.	*Digital Controls	TBD	TBD
6.			
7.			
8.			
9.			
10.			
11.			
12.			

* (May need LO Source (Signal Generator HP-8663A)) (350MHz)

Outputs

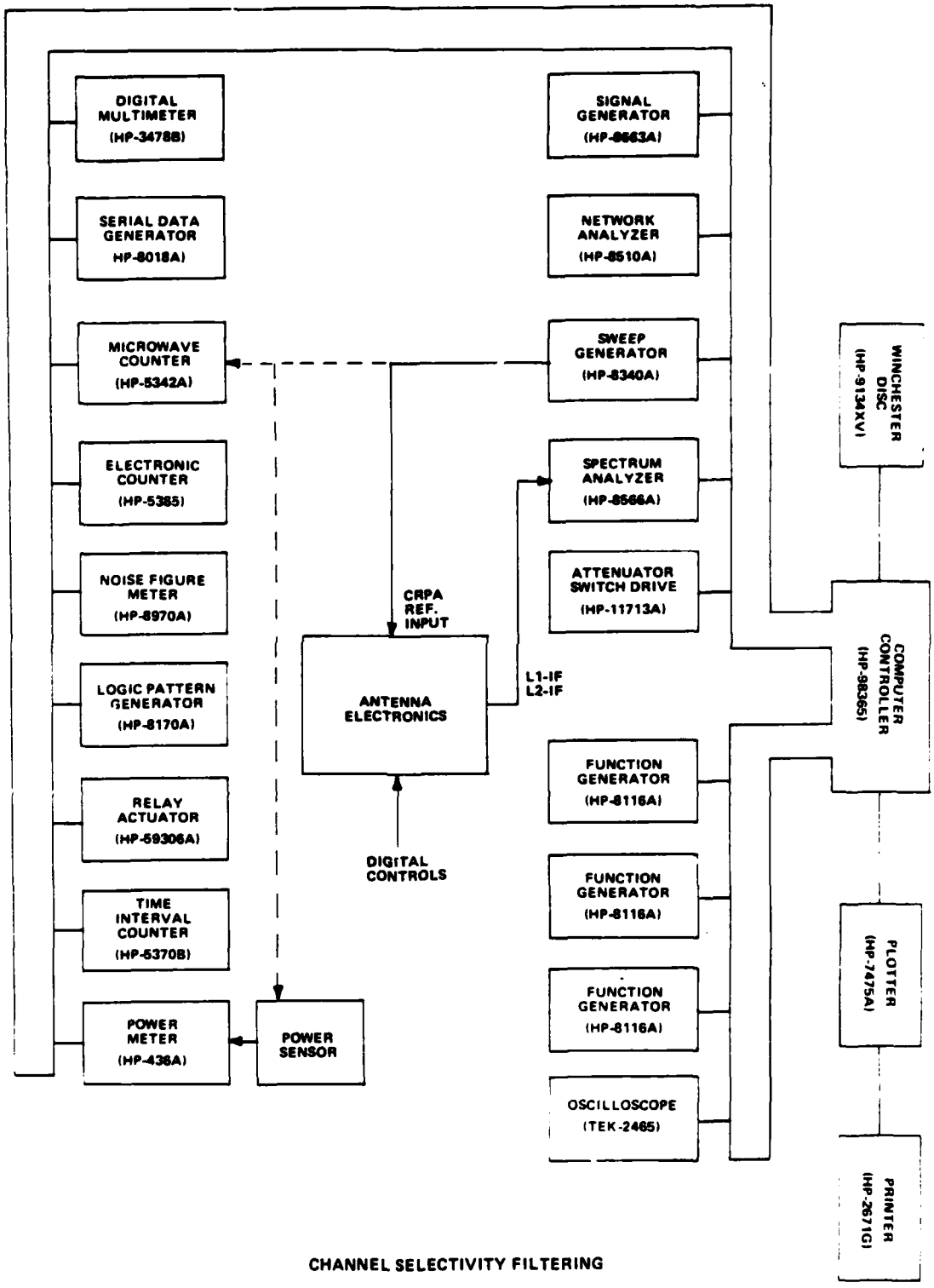
	Output Name	Output Level	Equipment Used
1.	L1 IF Output	3dB(Bw) - 30 ± 3MHz	Spectrum Anal. (HP-8566A)
2.	L1 IF Output	40dB(Bw) - 250MHz(max)	Spectrum Anal. (HP-8566A)
3.	L2 IF Output	3dB(Bw) - 30 ± 3MHz	
4.	L2 IF Output	40dB(BW) - 250MHz(max)	
5.			

Test Procedure: Turn on test equipment. Set measurement equipment to proper ranges. The AE will be connected to the Spectrum Analyzer. Input power to the AE will be -40dBm ± 5dB. The passband response at L1 between the CRPA input and the IF output will be measured and recorded. Repeat for L2. Apply proper digital control signals.

Data Reduction: Send output of Spectrum Analyzer to plotter and send inputs to printer. Read 3 and 40dB bandwidths from the passband response recorded on the plotter.

Equipment List:

1.	Computer (HP-9836S)	4.	Microwave Ctr (HP-5342A)	7.	Spectrum Anal. (HP-8566A)
2.	Printer (HP-2671G)	5.	Power Sensor (HP-8481A)	8.	Plotter (HP-7475A)
3.	Sweep Gen. (HP-8340A)	6.	Power Meter (HP-436A)	9.	



CHANNEL SELECTIVITY FILTERING

Contractor: Rockwell-Collins

Board Tested: Antenna Electronics

Test Objective: To verify that the noise figures of the AE reference, auxiliary and BMFRPA signal paths are within specified values. (Noise Figures)

Inputs

	Input Name	Input Level	Equipment Used
1.	CRPA Ref Input	TBD	Noise Source (HP-346B)
2.	CRPA Aux Inputs (6)	TBD	Noise Source (HP-346B)
3.	BMFRPA Input	TBD	Noise Source (HP-346B)
4.	Digital Controls	TBD	TBD
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			

Outputs

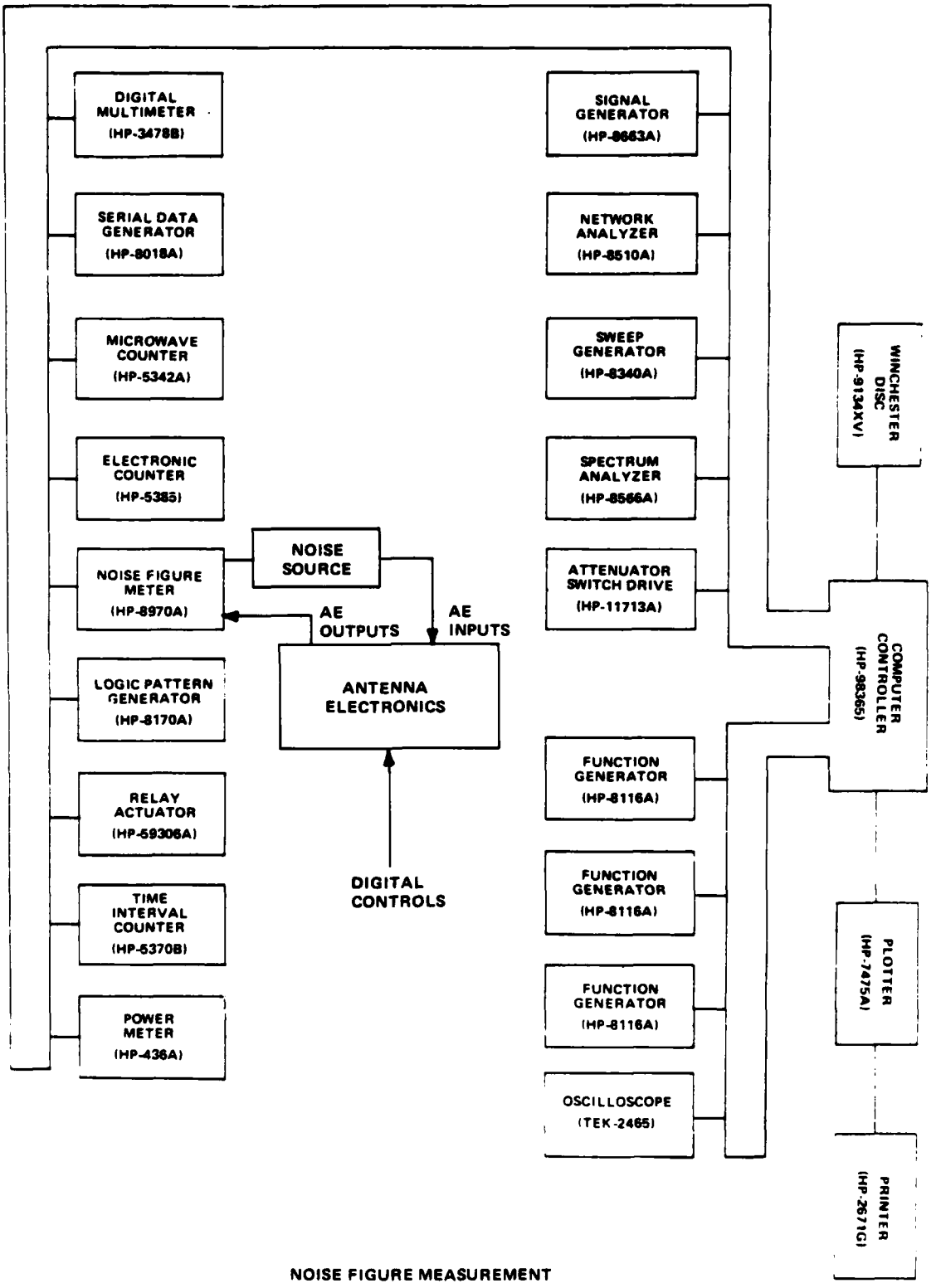
	Output Name	Output Level	Equipment Used
1.	L1 IF Output	Ref. Input (3dB max.)	Noise Figure Meter (HP-8970A)
2.	L1 IF Output	Aux Inputs (7.5dB max.)	Noise Figure Meter (HP-8970A)
3.	L1 IF Output	BMFRPA Input(3.5dB max.)	Noise Figure Meter (HP-8970A)
4.	L2 IF Output	Ref. Input (3dB max.)	Noise Figure Meter (HP-8970A)
5.	L2 IF Output	Aux. Inputs (7.5dB max.)	Noise Figure Meter (HP-8970A)
6.	L2 IF Output	BMFRPA Input (3.5dB max)	Noise Figure Meter (HP-8970A)

Test Procedure: Turn on test equipment. Set measurement equipment to proper ranges. Apply proper digital control signals. Apply noise source to AE inputs. Measure noise figure in each signal path with oise igure ter.

Data Reduction: Send input levels and output of Noise Figure Meter to printer.

Equipment List:

1.	Computer (HP-9836S)	4.	N.F. Meter (HP-8970A)	7.	
2.	Printer (HP-2671G)	5.		8.	
3.	Noise Source (HP-346B)	6.		9.	



NOISE FIGURE MEASUREMENT

Contractor: Rockwell-Collins

Board Tested: Antenna Electronics

Test Objective: To verify that the AE will not incur permanent damage or performance degradation after being subjected to specified input signal levels. (Non-damage input levels)

Inputs

	Input Name	Input Level	Equipment Used
1.	CRPA Ref Input	L1(1575.42MHz)@ 0dBm (CW)	Signal Gen. (HP-8663A)
2.	CRPA Aux Inputs (6)	L1(1575.42MHz)@ 0dBm (CW)	Signal Gen. (HP-8663A)
3.	BMFRPA Input	L1(1575.42MHz)@ 0dBm (CW)	Signal Gen. (HP-8663A)
4.	CRPA Ref Input	+30dBm Pp pulse, 4μW, 0.1%DC	Function Gen. (HP-8116A)
5.	CRPA Aux Inputs (6)	+30dBm Pp pulse, 4μW, 0.1%DC	Function Gen. (HP-8116A)
6.	BMFRPA Input	+30dBm Pp pulse, 4μW, 0.1%DC	Function Gen. (HP-8116A)
7.	Digital Controls	TBD	TBD
8.			Power Sensor (HP-8481H)
9.			Power Meter (HP-436A)
10.			Pin Mod. (HP-8731A)
11.			30dB PAD
12.			TWT Amplifier

Outputs

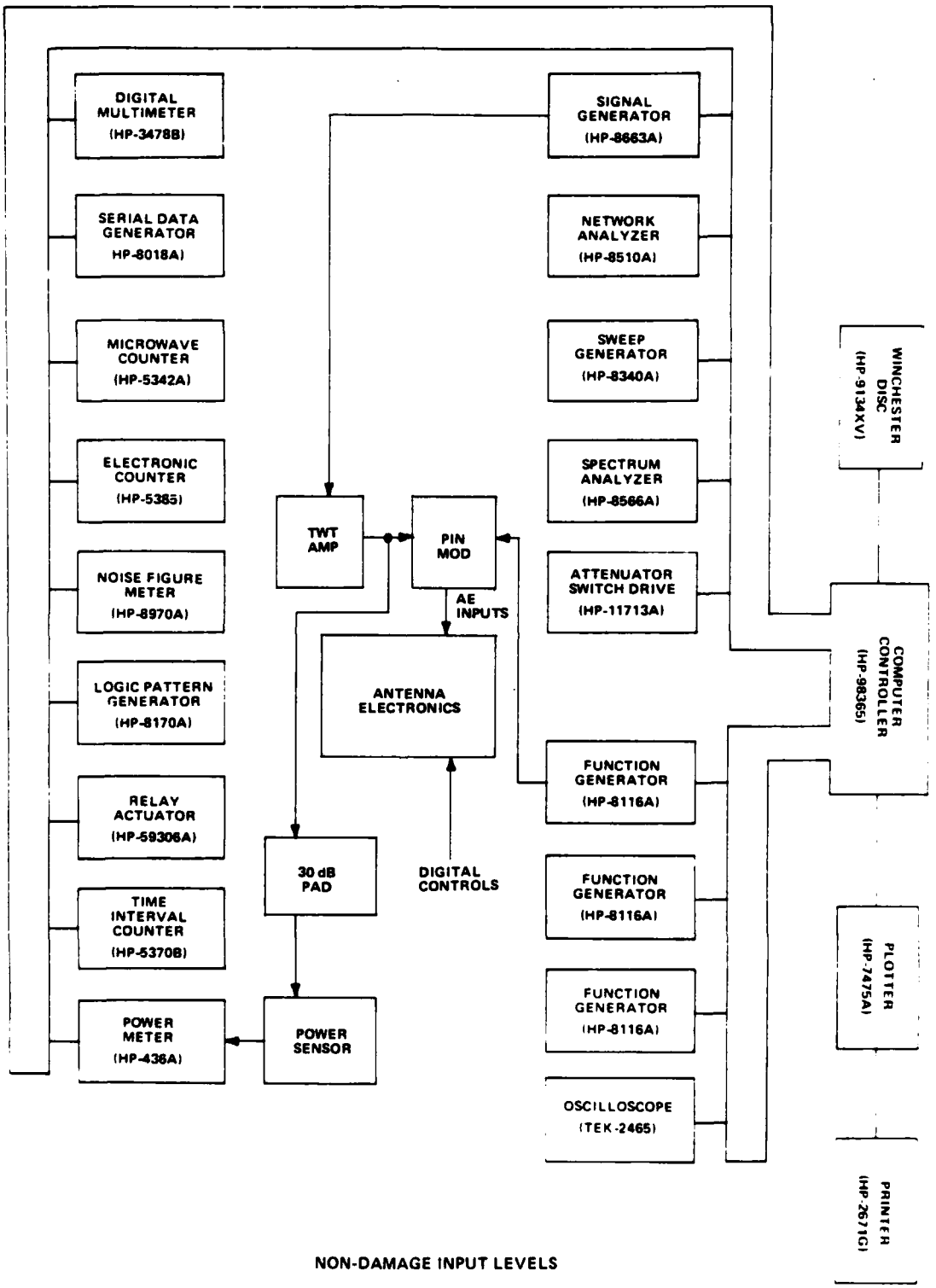
	Output Name	Output Level	Equipment Used
1.	---	---	---
2.			
3.			
4.			
5.			

Test Procedure: Turn on test equipment. Set measurement equipment to proper ranges. A 0dBm CW signal will be injected for five minutes alternatively into each of the CRPA inputs as well as the BMFRPA input. This will be repeated using a +30dBm peak power pulse signal with 4μs pulse width and 0.1% duty cycle for five minutes. The tests performed for GAIN and Noise Figure will be repeated. Repeat procedure for L2 frequency.

Data Reduction: Send input levels and output of Power Meter to printer. Compare results with data obtained in test performed for GAIN & NOISE FIGURE to verify no damage to AE.

Equipment List:

1.	Computer (HP-9836S)	4.	Function Gen. (HP-8116A)	7.	Amplifier
2.	Printer (HP-2671G)	5.	Power Sensor (HP-8481A) or H	8.	PIN Mod. (HP-8731B)
3.	Signal Gen. (HP-8663A)	6.	Power Meter (HP-436A)	9.	30db Pad



NON-DAMAGE INPUT LEVELS

Contractor: Rockwell-Collins

Board Tested: Antenna Electronics

Test Objective: To verify for a given frequency, the time delay from any CRPA auxiliary channel input to either the IF or MCR output does not vary more than a specified amount from the delay, from the reference channel input to the same output. (Time Delay) & (Time Delay Variations).

Inputs

	Input Name	Input Level	Equipment Used
1.	CRPA Ref Input	L1(1565.42 to 1585.42MHz) @ -45dBm	Sweep Gen. (HP-8340A)
2.	CRPA Ref Input	L2(1217.6 to 1237.6MHz) @ -45dBm	Sweep Gen. (HP-8340A)
3.	CRPA Aux Inputs (6)	L1(1565.42 to 1585.42MHz) @ -45dBm	Sweep Gen. (HP-8340A)
4.	CRPA Aux Inputs (6)	L2(1217.6 to 1237.6MHz) @ -45dBm	Sweep Gen. (HP-8340A)
5.	BMFRPA Input	L1(1565.42 to 1585.42MHz) @ -45dBm	Sweep Gen. (HP-8340A)
6.	BMFRPA Input	L2(1217.6 to 1237.6MHz) @ -45dBm	Sweep Gen. (HP-8340A)
7.	*Digital Controls	TBD	TBD
8.			
9.			
10.			
11.			
12.			

* May need LO signal

Outputs

	Output Name	Output Level	Equipment Used
1.	Aux 1-6 to IF out L1 or L2	0.8 ± 0.4ns	Network Anal. (HP-8510A)
2.	Aux 1-6 to MCR out L1 or L2	0.8 ± 0.4ns	S-Par Test Set (HP-8515A)
3.	L1-L2 variation		
4.	MCR Output	2 ns max.	
5.	IF output	2 ns max.	

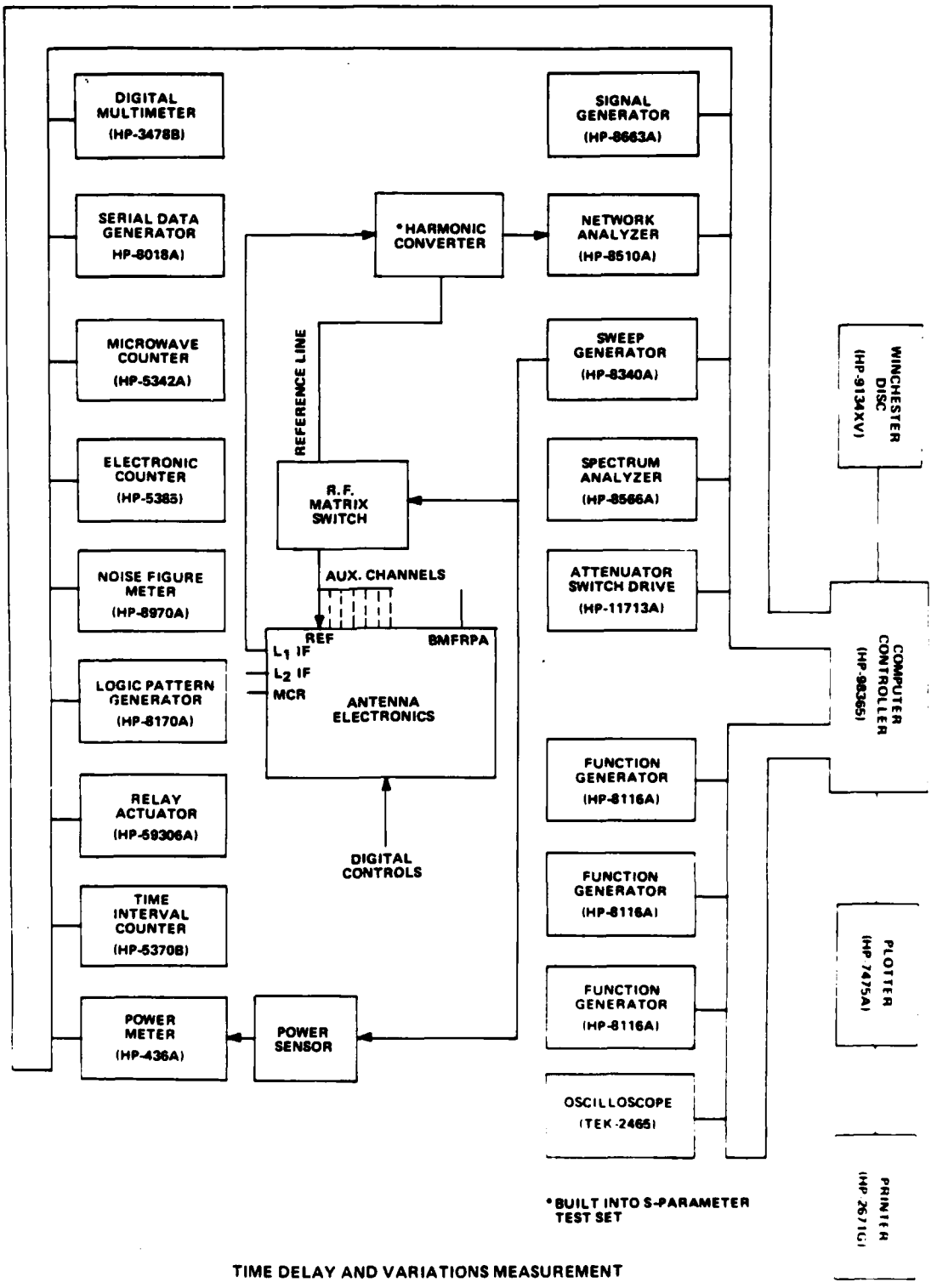
Test Procedure: Turn on test equipment. Set measurement equipment to proper ranges. Connect the sweep generator to the reference channel input of the AE and the L1 IF output to the test input of the harmonic converter* The reference input of the harmonic converter will be connected to the sweep generator by a calibrated line length. The HP-8510 display should show a flat phase slope. The sweep generator will be switched to each of the auxiliary channels and the phase slope will be observed. This will be repeated for L2 as well as for the MCR output. The Phase slope will be measured with the sweep gen. connected to the BMFRPA at both L1 & L2.

Data Reduction: Send output of Network Analyzer to plotter and send inputs to printer. Time delay will be calculated from phase slope recording by the 8510 display.

Equipment List:

1.	Computer (HP-9836S)	4.	Plotter (HP-7475A)	7.	RF Matrix Swtich
2.	Printer (HP-2671G)	5.	Network Anal. (HP-8510A)	8.	
3.	Sweep Gen. (HP-8340A)	6.	S-Par Test Set (HP-8515A)	9.	

*Harmonic Converter is built into S-Parameter Test Set.



TIME DELAY AND VARIATIONS MEASUREMENT

Contractor: Rockwell-Collins

Board Tested: Antenna Electronics

Test Objective: To verify the ability of the AE to select a reduced performance monitor bandwidth within a specified time after being commanded to do so (Nulling bandwidth selection).

Inputs

	Input Name	Input Level	Equipment Used
1.	CRPA Ref. Input	1580MHz @ -45dBm	Signal Gen. (HP-8663A)
2.	CRPA Aux. Inputs (6)	1580MHz @ -45dBm	RF Matrix Switch
3.			Power Sensor (HP-8481A)
4.			Power Meter (HP-436B)
5.	*Digital Controls	TBD	TBD
6.			
7.			
8.			
9.			
10.			
11.			
12.			

* May need LO signal

Outputs

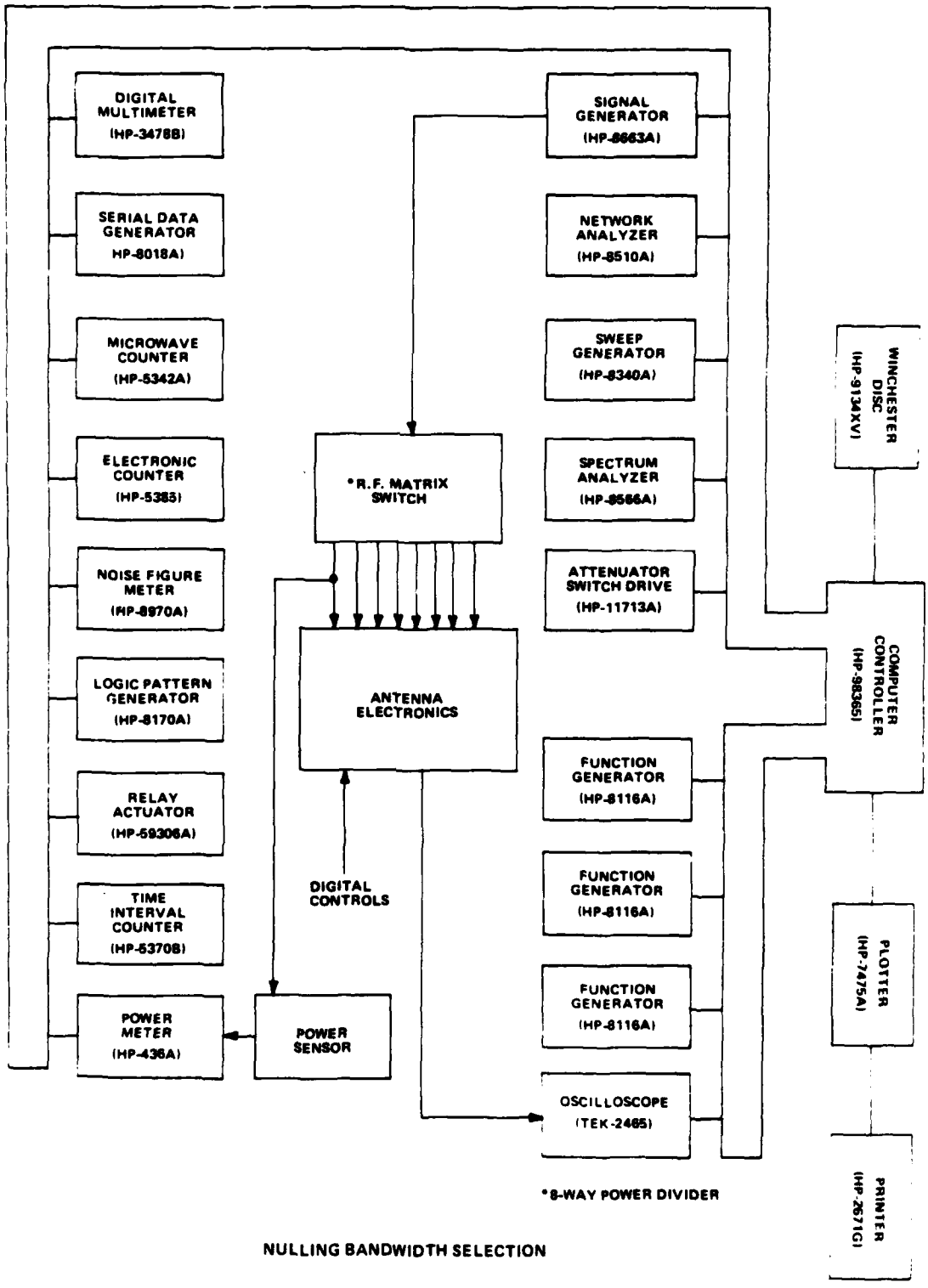
	Output Name	Output Level	Equipment Used
1.	C/A to P	20 ms (max)	Oscilloscope (TEK-2465)
2.	P to C/A	20 ms (max)	
3.			
4.			
5.			

Test Procedure: Turn on test equipment. Set measurement equipment to proper ranges. A -45dBm signal will be injected into the AE input. The signal should be outside the C/A bandwidth but in the P-Bandwidth. Using an oscilloscope to observe the output (triggered from the bandwidth select line), the time required to change bandwidth will be recorded.

Data Reduction: Send output of Oscilloscope to plotter and send inputs to printer.

Equipment List:

1.	Computer (HP-9836S)	4.	Plotter (HP-7475A)	7.	Power Sensor (HP-8481A)
2.	Printer (HP-2671G)	5.	RF Switch Matrix	8.	Power Meter (HP-436A)
3.	Signal Gen. (HP-8665A)	6.	Oscilloscope (TEK-2465)	9.	



NULLING BANDWIDTH SELECTION

Contractor: Rockwell-Collins

Board Tested: Antenna Electronics

Test Objective: To verify that the AE will switch nulling frequency bands within a specified time upon command. (Nulling frequency selection)

Inputs

	Input Name	Input Level	Equipment Used
1.	CRPA Ref. Input	L1/L2 @ -45dBm	Signal Gen. (HP-8663)
2.	CRPA Aux. Inputs(s)	L1/L2 @ -45dBm	Sweep Gen. (HP-8340A)
3.			RF Matrix Switch
4.			Power Sensor (HP-8481A)
5.			Power Meter (HP-436B)
6.	*Ligital Controls	TBD	TBD
7.			
8.			
9.			
10.			
11.			
12.			

*May need LO signal

Outputs

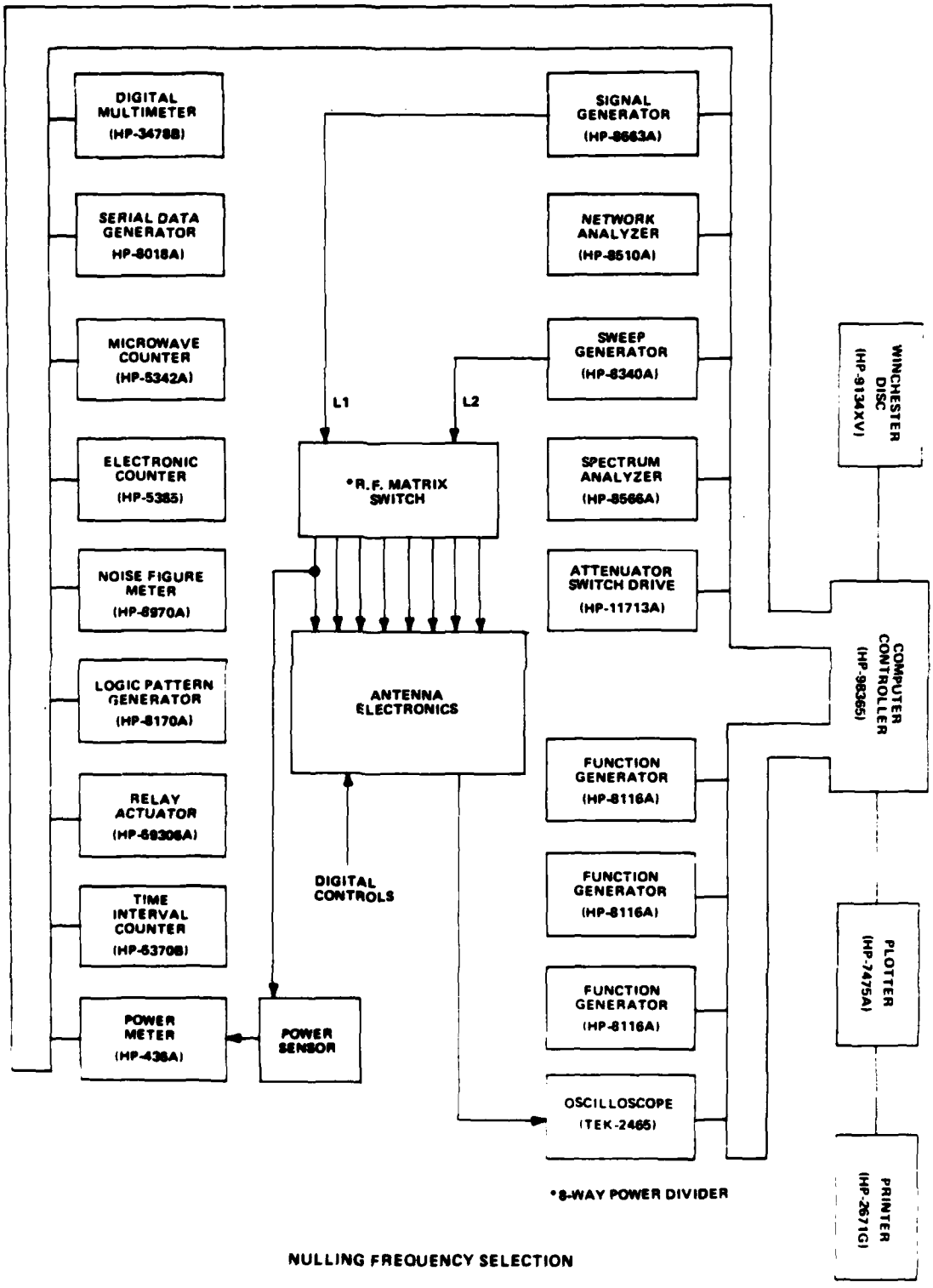
	Output Name	Output Level	Equipment Used
1.	L1 (1575MHz)	10ms (max.)	Oscilloscope (TEK-2465)
2.	L2 (1227MHz)	10ms (max.)	
3.			
4.			
5.			

Test Procedure: Turn on test equipment. Set measurement equipment to proper ranges. Two -45dBm CW jammers will be set up: one at L1 and one at L2, and both of these be input to all 7 channels of the AE. The Oscilloscope will be used to observe the output while being triggered from the frequency select line of the AE. The frequency select will be commanded and the nulling time will be recorded.

Data Reduction: Send output of Oscilloscope to plotter and send inputs to printer. Frequency switching times will be determined from Oscilloscope.

Equipment List:

1.	Computer (HP-9836S)	4.	Sweep Gen. (HP-8340A)	7.	Plotter (HP-7475A)
2.	Printer (HP-2671G)	5.	RF Switch Matrix	8.	Power Sensor (HP-8481A)
3.	Signal Gen. (HP-8663A)	6.	Oscilloscope (TEK-2465)	9.	Power Meter (HP-436A)



NULLING FREQUENCY SELECTION

Contractor: Rockwell-Collins

Board Tested: Antenna Electronics

Test Objective: To verify that the AE can select the BMFRPA in any of its three modes within the specified time. (BMFRPA Selection)

Inputs

	Input Name	Input Level	Equipment Used
1.	BMFRPA Input	1575MHz @ -45dBm	Signal Gen. (HP-8663A)
2.		1227MHz @ -45dBm	Signal Gen. (HP-8663A)
3.	*Digital Controls	TBD	TBD
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			

*May need LO signal

Outputs

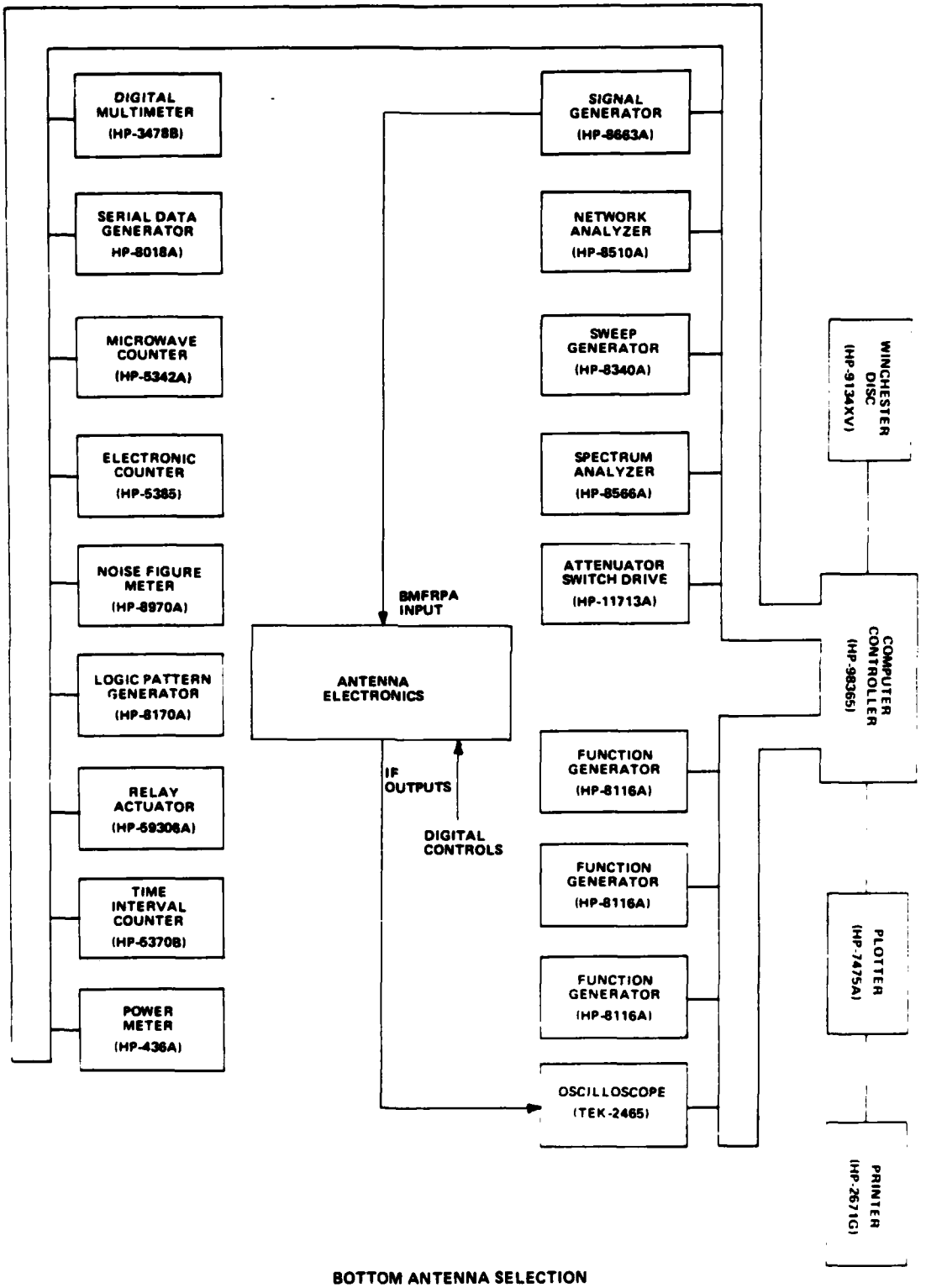
	Output Name	Output Level (Cont'd)	Equipment Used
1.	IF Outputs	BMFRPA L2 to L1 10ms max. (1227MHz)	Oscilloscope (TEK-2465)
	OUTPUT LEVEL	BMFRPA L1 to L2 10ms max. (1227MHz)	
	CA to P Code 20ms max.	BMFRPA L1 Signal Select 10ms max.	
	P to CA Code 20ms max.	BMFRPA L2 Signal Select 10ms max.	
	BMFRPA L2 to L1 10ms max. (1575MHz)		
	BMFRPA L1 to L2 10ms max. (1575MHz)		

Test Procedure: Turn on test equipment. Set measurement equipment to proper ranges. On L1, -45dBm signal will be injected into the BMFRPA input. The output will be observed with an Oscilloscope and each of the 3 modes (L1, L2, L1/L2) of the BMFRPA will be selected while recording the switching transients from the Oscilloscope.

Data Reduction: Send output of Oscilloscope to plotter and send inputs to printer. Read switching time from Oscilloscope.

Equipment List:

1.	Computer (HP-9836S)	4.	Signal Gen. (HP-8663A)	7.	
2.	Printer (HP-2671G)	5.	Plotter (HP-7475A)	8.	
3.	Oscilloscope (TEK-2465)	6.		9.	



BOTTOM ANTENNA SELECTION

Contractor: Rockwell-Collins

Board Tested: Antenna Electronics

Test Objective: To verify the ability of the AE to null jammers in the P-Code mode. (P-code wideband nulling)

Inputs

	Input Name	Input Level	Equipment Used
1.	CRPA Ref. Input	1575MHz @ -45dBm	Signal Gen. (HP-8663A)
2.	CRPA Aux. Inputs(6)	1575MHz @ -45dBm	Signal Gen. (HP-8663A)
3.	CRPA Ref. Input	1227MHz @ -45dBm	Signal Gen. (HP-8663A)
4.	CRPA Aux. Inputs(6)	1227MHz @ -45dBm	Signal Gen. (HP-8663A)
5.			RF Switch Matrix
6.			Power Sensor (HP-8481A)
7.			Power Meter (HP-436A)
8.	*Digital Controls	TBD	TBD
9.			
10.			
11.			
12.			

*May need LO source

Outputs

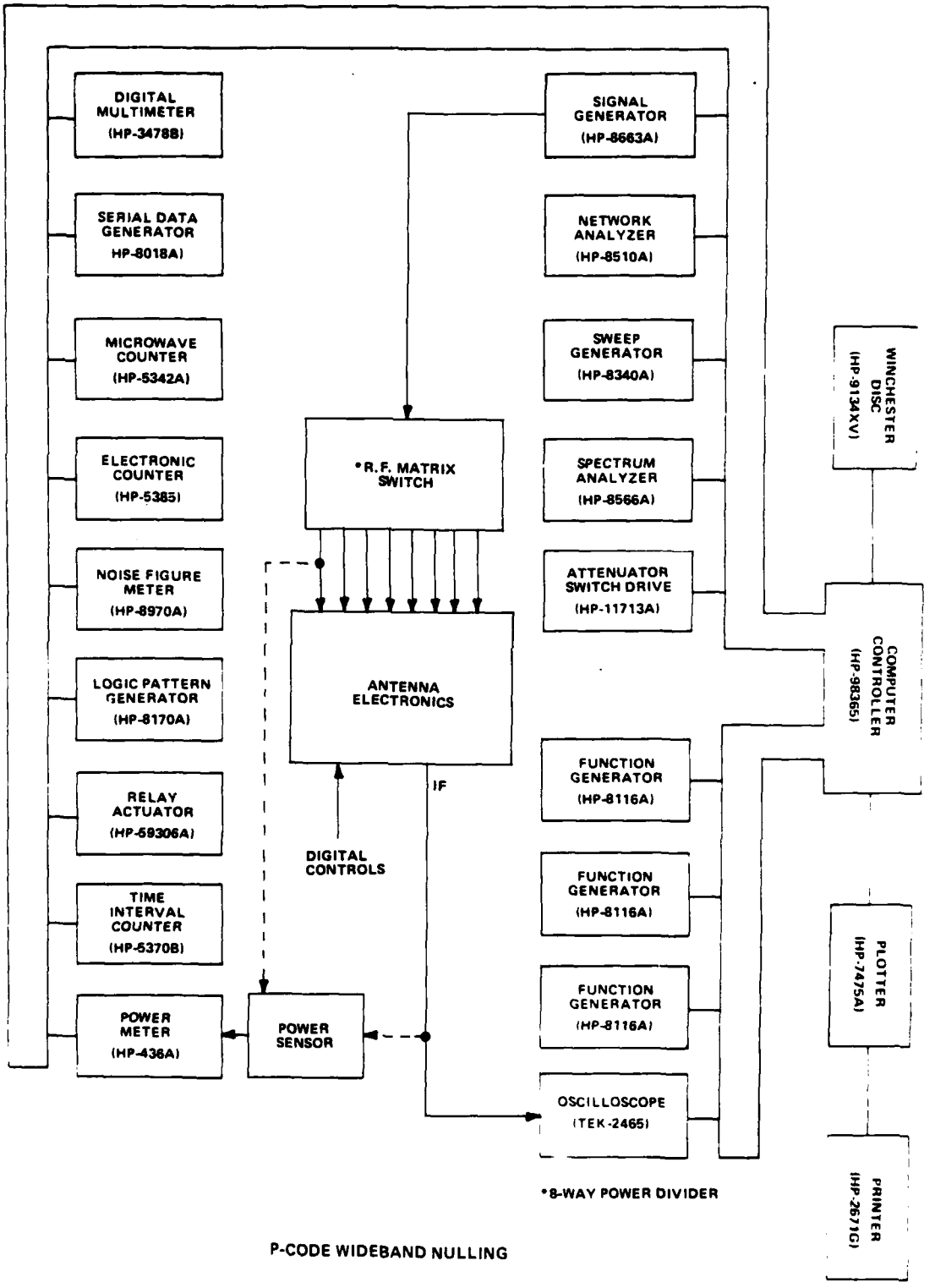
	Output Name	Output Level	Equipment Used
1.	L1 IF Null Depth	35dB (min)	Power Meter (HP-436A)
2.	L1 IF Null Time	10ms (max)	Power Sensor (HP-8481A)
3.	L2 IF Null Depth	35dB (min)	Oscilloscope (TEK-2465)
4.	L2 IF Null Time	10ms (max)	
5.			

Test Procedure: Turn on test equipment. Set measurement equipment to proper ranges. A -45dBm jammer input level will be set up and P-code nulling will be selected. Using the Oscilloscope to observe the AE Test Set performance monitor video output, the nulling time will be recorded. A Power Meter will be used to measure the AE IF output power (null depth). Repeat for L1 and L2.

Data Reduction: Send input levels and output of Power Meter to printer. Output data from Oscilloscope to plotter.

Equipment List:

1.	Computer (HP-9836S)	4.	(RF Matrix Switch) (8-way Power Divider)	7.	Oscilloscope (TEK-2465)
2.	Printer (HP-2671G)	5.	Power Sensor (HP-8481A)	8.	
3.	Sig. Gen. (HP-8663A)	6.	Power Meter (HP-436A)	9.	



P-CODE WIDEBAND NULLING

Contractor: Rockwell-Collins

Board Tested: Antenna Electronics

Test Objective: To verify the ability of the AE to null wideband noise jammers while in the P-code mode. (Wide Band Noise Nulling)

Inputs

	Input Name	Input Level	Equipment Used
1.	CRPA Ref. Input	1575MHz @ -45dBm	Noise Generator (20MHz BW)
2.	CRPA Aux. Inputs(6)	1575MHz @ -45dBm	Noise Generator (20MHz BW)
3.	CRPA Ref. Input	1227MHz @ -45dBm	Noise Generator (20MHz BW)
4.	CRPA Aux. Inputs(6)	1227MHz @ -45dBm	Noise Generator (20MHz BW)
5.			RF Switch Matrix
6.			Power Sensor (HP-8481A)
7.			Power Meter (HP-436A)
8.	*Digital Controls	TBD	TBD
9.			
10.			
11.			
12.			

*May need LO source

Outputs

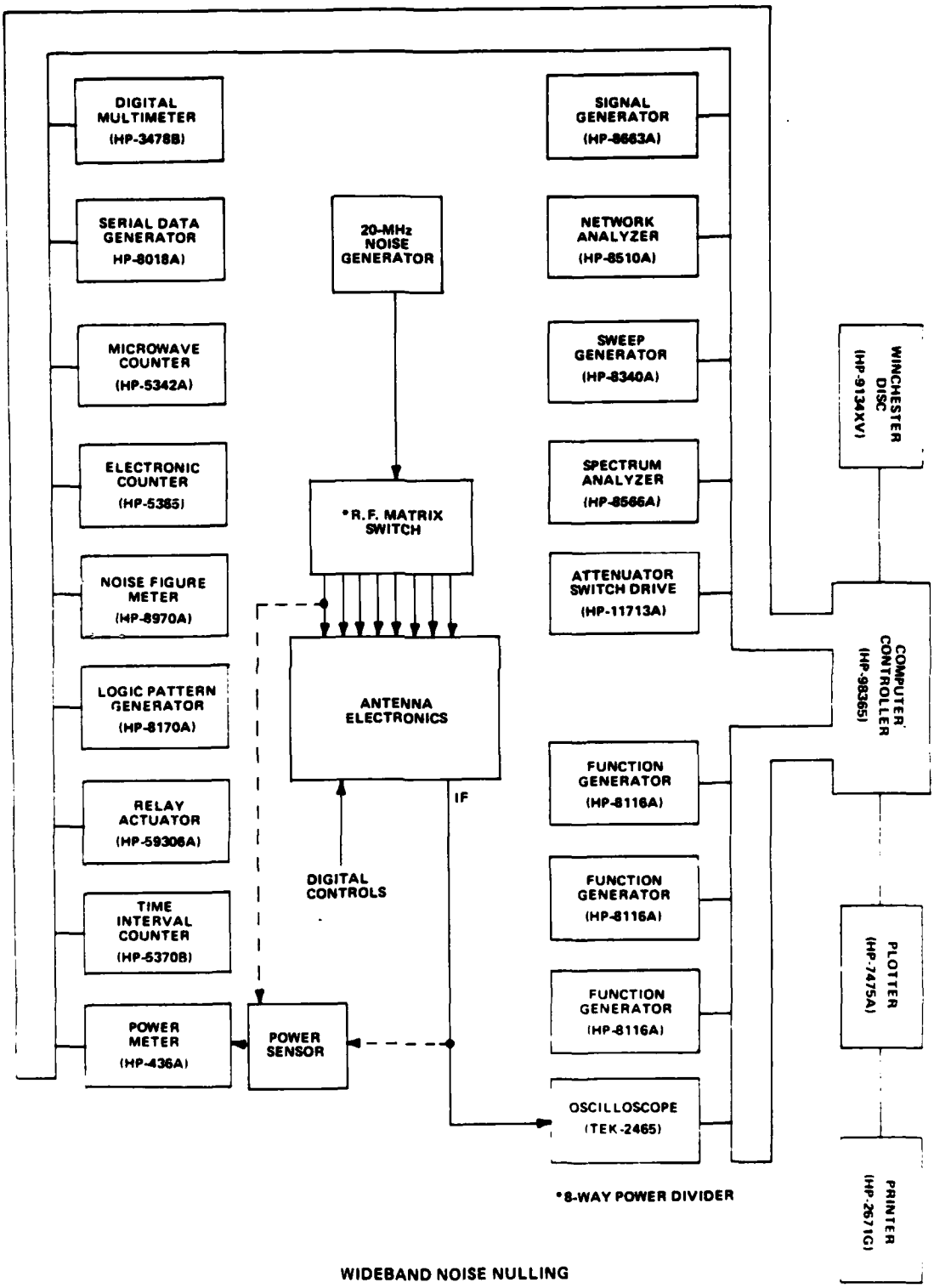
	Output Name	Output Level	Equipment Used
1.	L1 IF Null Depth	30dB (min)	Power Sensor (HP-8481A)
2.	L1 IF Null Time	10ms (max)	Power Meter (HP-436A)
3.	L2 IF Null Depth	30dB (min)	Oscilloscope (TEK-2465)
4.	L2 IF Null Time	10ms (max)	
5.			

Test Procedure: Turn on test equipment. Set measurement equipment to proper ranges. A -45dBm wideband jammer input level will be set up and P-code nulling will be selected. Using the Oscilloscope to observe the output, the Nulling Time will be recorded. A Power Meter will be used to measure the AE output power (null depth). Repeat for L1 and L2.

Data Reduction: Send input levels and output of Power Meter to printer. Output data from Oscilloscope to plotter.

Equipment List:

1.	Computer (HP-9836S)	4.	(RF Matrix Switch) 8-way power divider	7.	Oscilloscope (TEK-2465)
2.	Printer (HP-2671G)	5.	Power Sensor (HP-8481A)	8.	
3.	Noise Gen. (20MHz BW)	6.	Power Meter (HP-436A)	9.	



WIDEBAND NOISE NULLING

Contractor: Rockwell-Collins

Board Tested: Antenna Electronics

Test Objective: To verify the ability of the AE to null wideband jammers a specified amount while in the C/A mode. (C/A Code Nulling)

Inputs

	Input Name	Input Level	Equipment Used
1.	CRPA Ref. Input	1575MHz @ -78dBm	Sig. Gen. (HP-8663A)
2.	CRPA Aux. Inputs(6)	1575MHz @ -78dBm	Sig. Gen. (HP-8663A)
3.	CRPA Ref. Input	1227MHz @ -78dBm	Sig. Gen. (HP-8663A)
4.	CRPA Aux. Inputs(6)	1227MHz @ -78dBm	Sig. Gen. (HP-8663A)
5.			RF Matrix Switch
6.			Spectrum Anal. (HP-8566A)
7.	*Digital Control	TBD	TBD
8.			
9.			
10.			
11.			
12.			

*May need LO source

Outputs

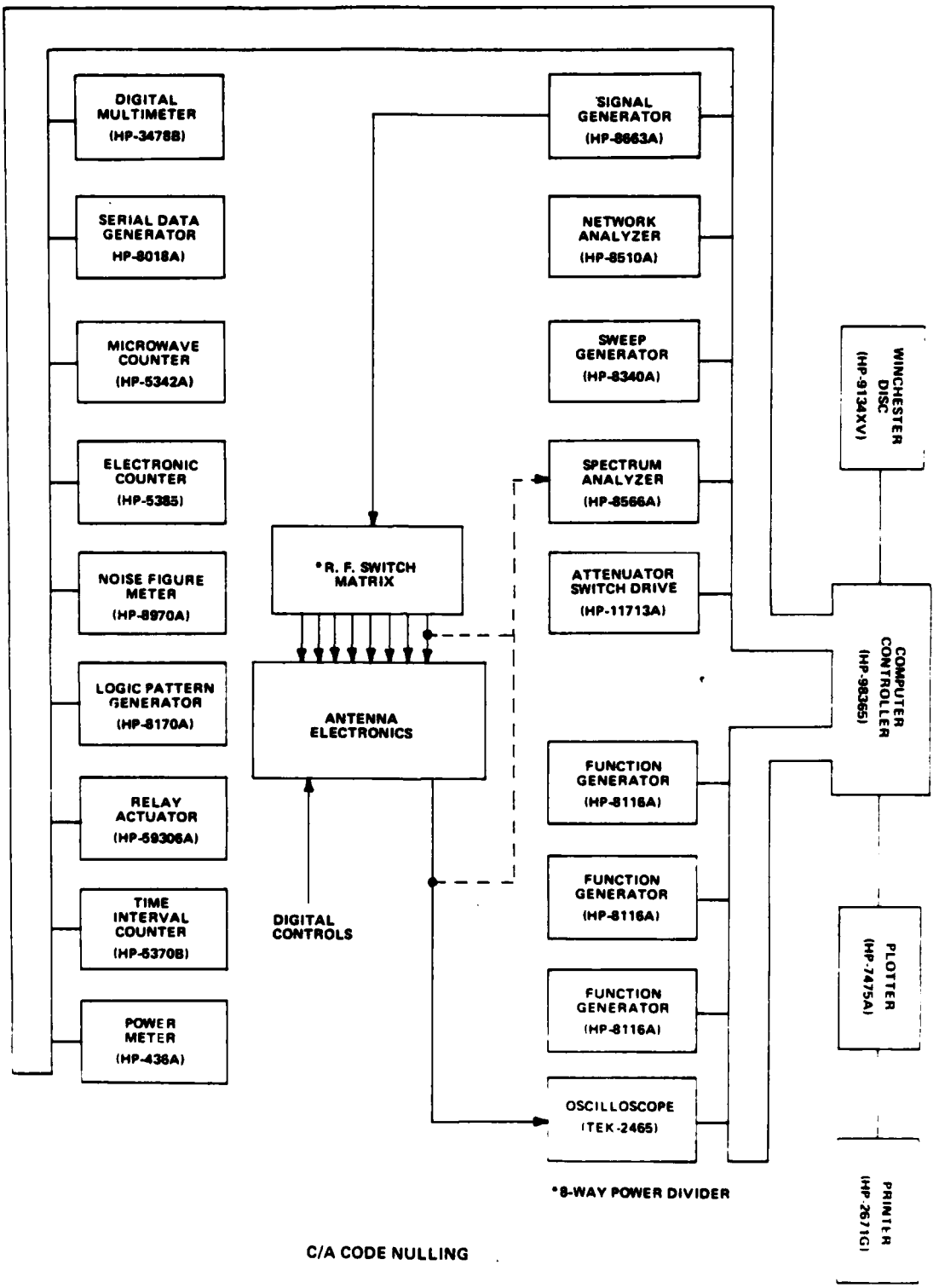
	Output Name	Output Level	Equipment Used
1.	L1 IF Null Depth	25dB (min)	Spectrum Anal. (HP-8566A)
2.	L1 IF Null Time	100ms (max)	Oscilloscope (TEK-2465)
3.	L2 IF Null Depth	25dB (min)	
4.	L2 IF Null Time	100ms (max)	
5.			

Test Procedure: Turn on test equipment. Set measurement equipment to proper ranges. A jammer input level of -78dBm will be set up and the C/A code nulling mode will be selected. The Oscilloscope will be used to observe the output, the nulling time will be recorded. A Spectrum Analyzer will be used to monitor the AE IF output power (null depth). Repeated for L1 and L2.

Data Reduction: Send output of Spectrum Analyzer and Oscilloscope to plotter and send inputs to printer.

Equipment List:

1.	Computer (HP-9836S)	4.	(RF Matrix Switch) (8-way Power Divider)	7.	Plotter (HP-7475A)
2.	Printer (HP-2671G)	5.	Spec. Analyzer (HP-8481A)	8.	
3.	Sig. Gen. (HP-8663A)	6.	Oscilloscope (TEK-2465)	9.	



C/A CODE NULLING

Contractor: Rockwell-Collins

Board Tested: Antenna Electronics

Test Objective: To measure the AE BIT duration. The BIT duration shall be 834μs ±10μs (BIT Duration)

Inputs

	Input Name	Input Level	Equipment Used
1.	Z80	TBD	TEK emulator probe (TEK 8561-40A)
2.	Digital Controls	TBD	TBD
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			

Outputs

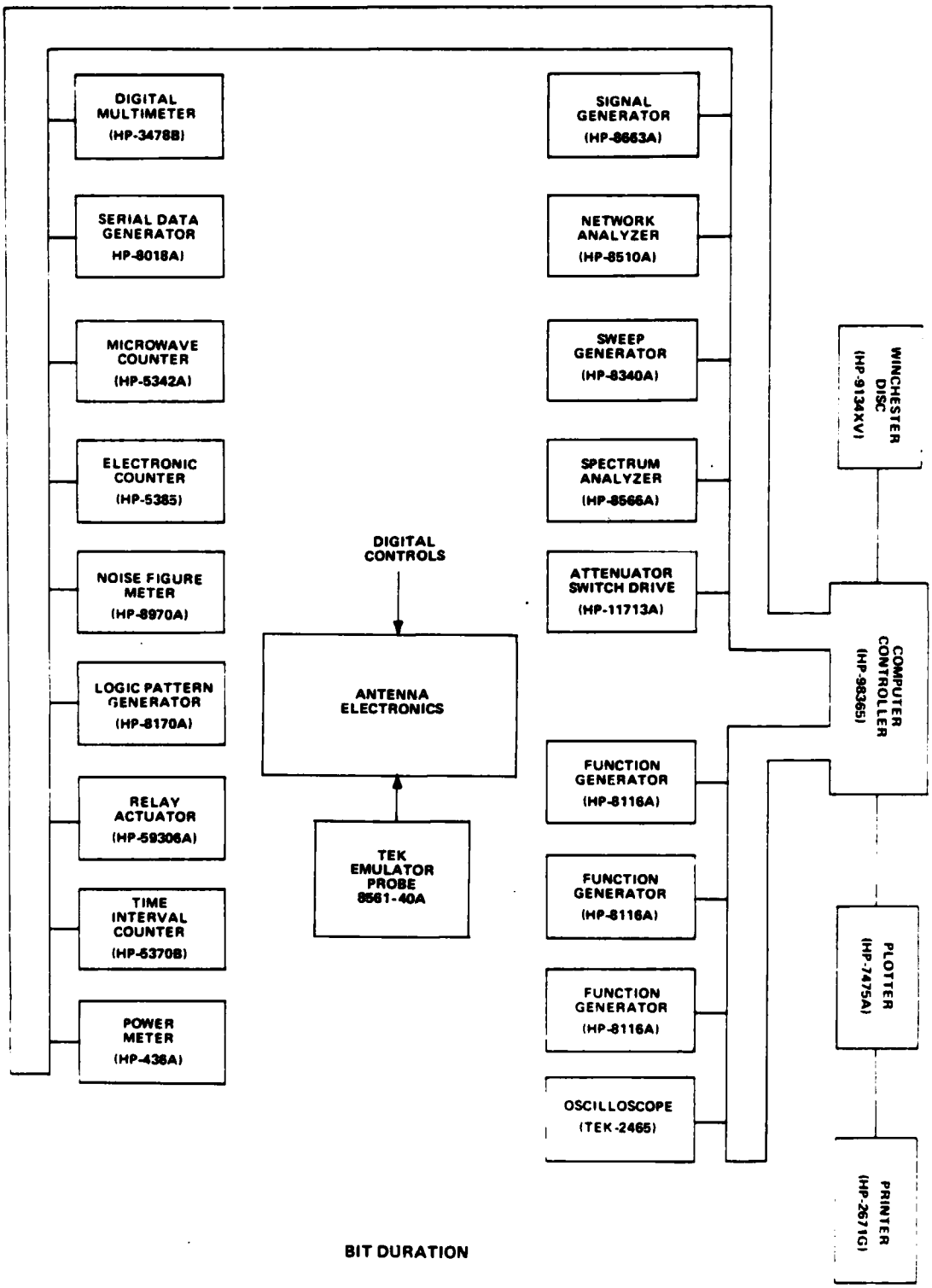
	Output Name	Output Level	Equipment Used
1.			
2.			
3.			
4.			
5.			

Test Procedure: Turn on test equipment. Set measurement equipment to proper ranges. Insert the emulator probe of the TEK(8561-40A) in place of Z-80 in the AE. Set registers P, E and B so that only on BIT equals one (1). Using the event time, measure duration of BIT. At the present time, it is not recommended that this equipment be purchased because of cost. Alterations are currently being studied.

Data Reduction: Send input and output levels to printer.

Equipment List:

1.	Computer (HP-9836S)	4.		7.	
2.	Printer (HP-2671G)	5.		8.	
3.	Tektronics Probe (8561-40A)	6.		9.	



BIT DURATION

Contractor: Rockwell-Collins

Board Tested: Antenna Electronics

Test Objective: To verify the quality of cable connections between the functional blocks of the AE (LRU's). (Continuity Check)

Inputs

	Input Name	Input Level	Equipment Used
1.	Digital Controls	TBD	TBD
2.	----	---	---
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			

Outputs

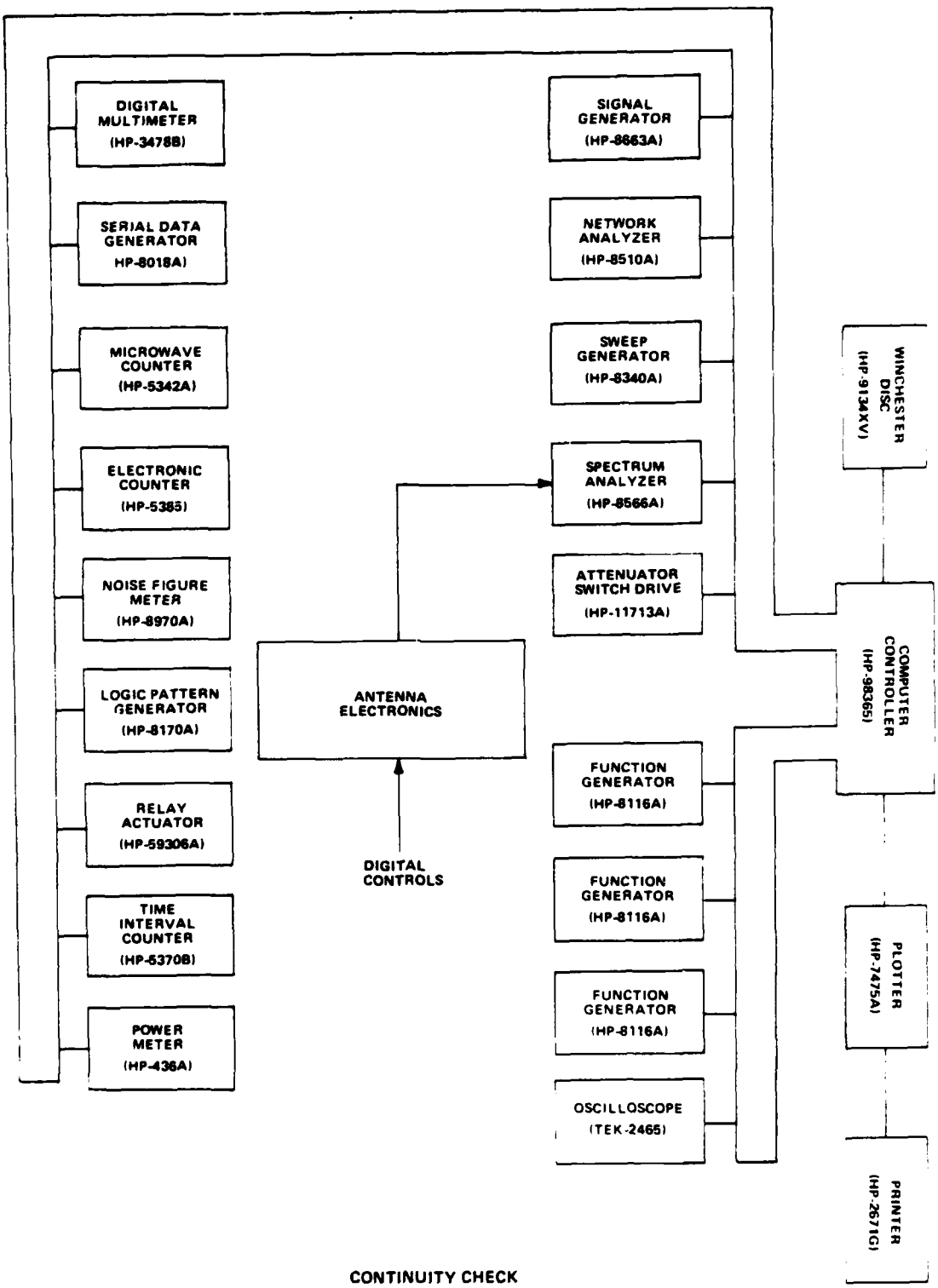
	Output Name	Output Level	Equipment Used
1.	AE Output	10dB change	Spectrum Anal. (HP-8566A)
2.			
3.			
4.			
5.			

Test Procedure: Turn on test equipment. Set measurement equipment to proper ranges. Continuity will be checked by observing the change in the level of the noise floor when the weights are switched from the minimum noise condition to maximum noise condition. This will be shown by observing the output. A 10dB change will verify the test.

Data Reduction: Send output of Spectrum Analyzer to plotter and send inputs to printer.

Equipment List:

1.	Computer (HP-9836S)	4.	Spectrum Anal. (HP-8566A)	7.	
2.	Printer (HP-2671G)	5.		8.	
3.	Plotter (HP-7475A)	6.		9.	



CONTINUITY CHECK

Contractor: Rockwell-Collins

Board Tested: Antenna Electronics

Test Objective: To demonstrate that the LRU status is set to state 1 during normal operation in null steering mode. (LRU Status)

Inputs

	Input Name	Input Level	Equipment Used
1.	Digital Controls	TBD	TBD
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			

Outputs

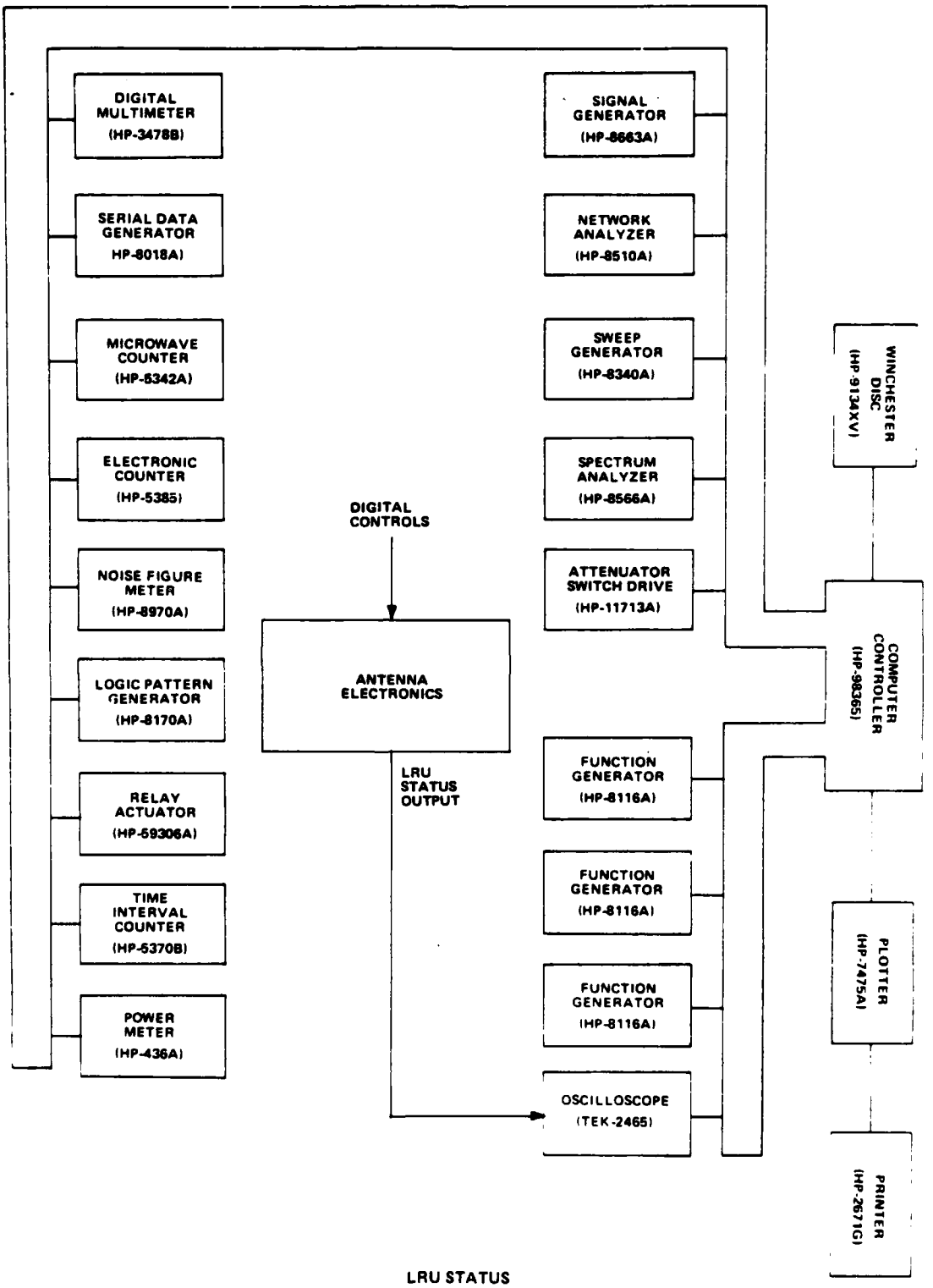
	Output Name	Output Level	Equipment Used
1.	LRU Status	OK	Oscilloscope (TEK-2465)
2.			
3.			
4.			
5.			

Test Procedure: Turn on test equipment. Set measurement equipment to proper ranges. Monitor LRU status during normal operation in null steering mode.

Data Reduction: Send input levels to printer and output of Oscilloscope to plotter.

Equipment List:

1.	Computer (HP-9836S)	4.	Plotter (HP-7475A)	7.	
2.	Printer (HP-2671G)	5.		8.	
3.	Oscilloscope (TEK-2465)	6.		9.	


DIGITAL MULTIMETER (HP-3478B)
SERIAL DATA GENERATOR HP-8018A)
MICROWAVE COUNTER (HP-5342A)
ELECTRONIC COUNTER (HP-5385)
NOISE FIGURE METER (HP-8970A)
LOGIC PATTERN GENERATOR (HP-8170A)
RELAY ACTUATOR (HP-59306A)
TIME INTERVAL COUNTER (HP-5370B)
POWER METER (HP-436A)
SIGNAL GENERATOR (HP-8663A)
NETWORK ANALYZER (HP-8510A)
SWEEP GENERATOR (HP-8340A)
SPECTRUM ANALYZER (HP-8566A)
ATTENUATOR SWITCH DRIVE (HP-11713A)
DIGITAL CONTROLS
ANTENNA ELECTRONICS
LRU STATUS OUTPUT
FUNCTION GENERATOR (HP-8116A)
FUNCTION GENERATOR (HP-8116A)
FUNCTION GENERATOR (HP-8116A)
OSCILLOSCOPE (TEK-2465)
WINCHESTER DISC (HP-9134XV)
COMPUTER CONTROLLER (HP-98365)
PLOTTER (HP-7475A)
PRINTER (HP-2671G)
LRU STATUS

Contractor: Rockwell-Collins

Board Tested: Antenna Electronics

Test Objective: To verify that the timing of events is as specified (Sequence Diagram BIT)

Inputs

	Input Name	Input Level	Equipment Used
1.	Digital Controls	TBD	TBD
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			

Outputs

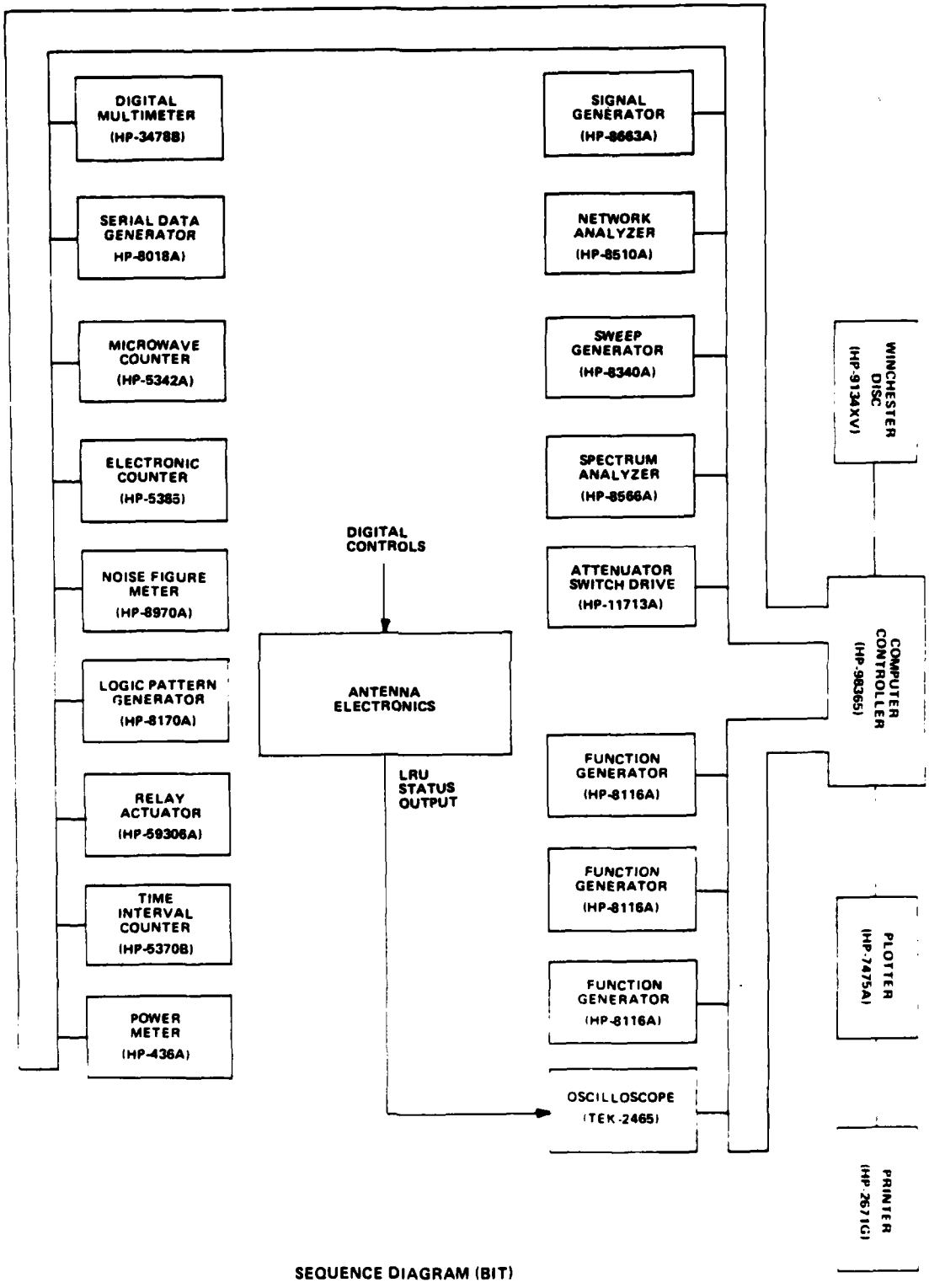
	Output Name	Output Level	Equipment Used
1.	LRU Status Line	OK	Oscilloscope (TEK-2465)
2.			
3.			
4.			
5.			

Test Procedure: Turn on test equipment. Set measurement equipment to proper ranges. The sequence of events will be demonstrated using an Oscilloscope connected to the LRU Status Line.

Data Reduction: Send input levels to printer and output of Oscilloscope to plotter.

Equipment List:

1.	Computer (HP-9836S)	4.	Plotter (HP-7475A)	7.	
2.	Printer (HP-2671G)	5.		8.	
3.	Oscilloscope (TEK-2465)	6.		9.	



SEQUENCE DIAGRAM (BIT)

Contractor: Rockwell-Collins

Board Tested: Antenna Electronics

Test Objective: To demonstrate that the AE generates and transmits the acknowledgement and the test result word. (Test result word acknowledgement)

Inputs

	Input Name	Input Level	Equipment Used
1.	BITE (command BIT)	TBD	Logic Pattern Gen. (HP-8170A)
2.	Digital Controls	TBD	TBD
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			

Outputs

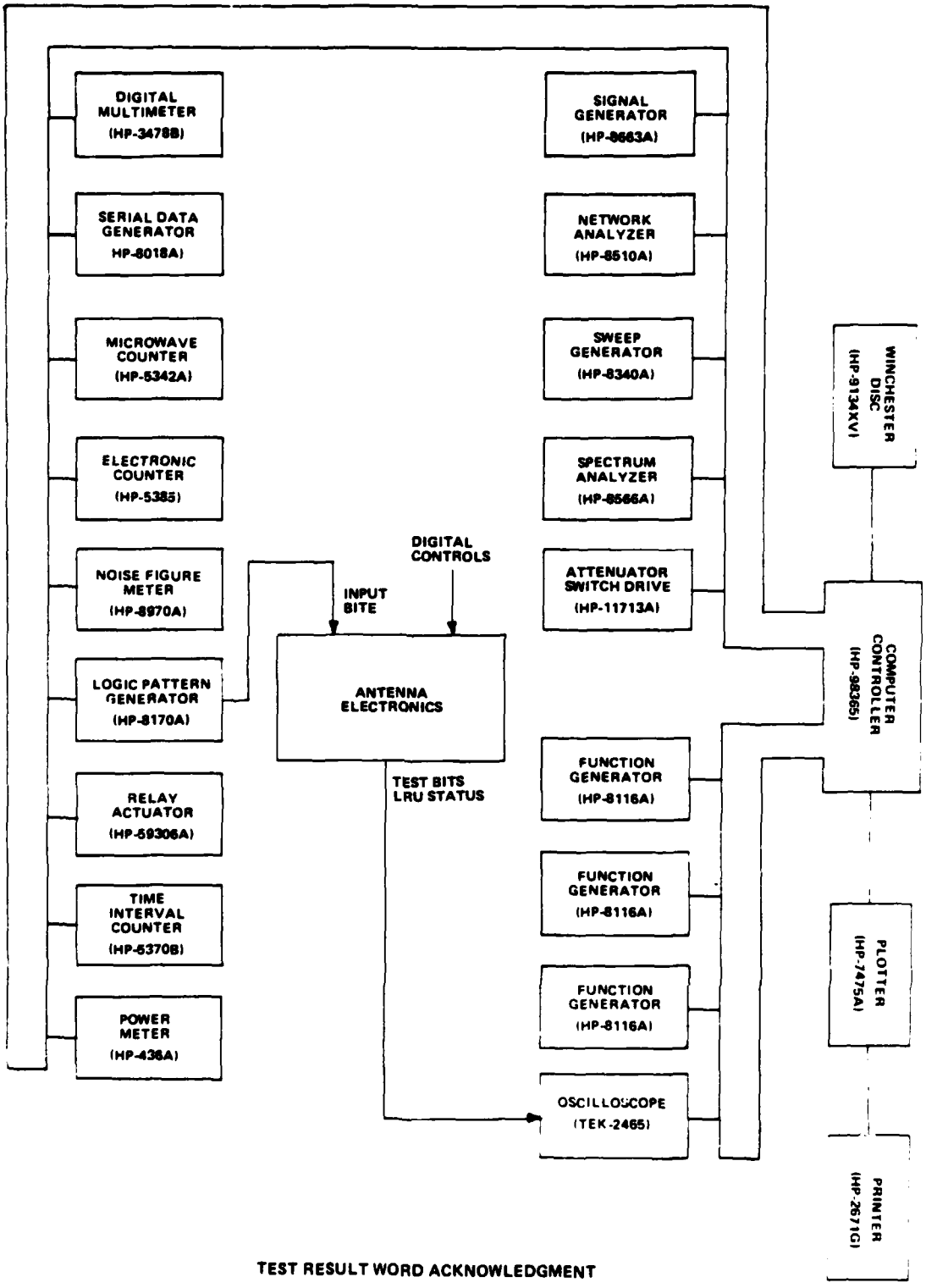
	Output Name	Output Level	Equipment Used
1.	LRU Status Output	OK	Oscilloscope (TEK-2465)
2.			
3.			
4.			
5.			

Test Procedure: Turn on test equipment. Set measurement equipment to proper ranges. Input BITE and record LRU Status output on Oscilloscope.

Data Reduction: Send input levels to printer and output of Oscilloscope to plotter. Verify that format and length of test result word is as specified.

Equipment List:

1.	Computer (HP-9836S)	4.	Log. Patt. Gen. (HP-8170A)	7.	
2.	Printer (HP-2671G)	5.		8.	
3.	Oscilloscope (TEK-2465)	6.		9.	



TEST RESULT WORD ACKNOWLEDGMENT

Contractor: Rockwell-Collins

Board Tested: Antenna Electronics

Test Objective: To demonstrate that the AE generates and transmits the result word. (Word Format)

Inputs

	Input Name	Input Level	Equipment Used
1.	BITC	TBD	Logic Pattern Generator (HP-8170A)
2.	Digital Controls	TBD	TBD
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			

Outputs

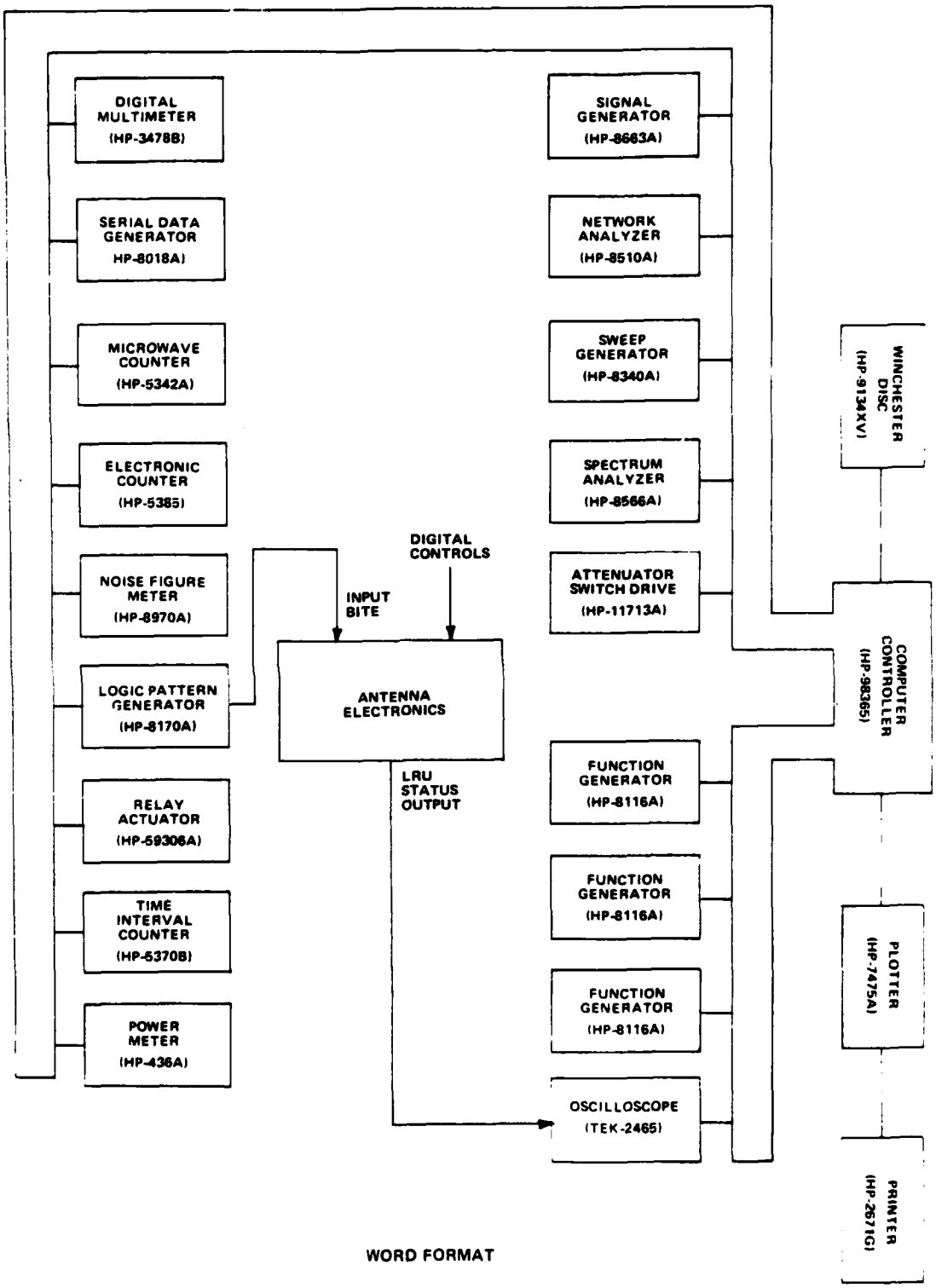
	Output Name	Output Level	Equipment Used
1.	LRU Status Output	TBD	Oscilloscope (TEK-2465)
2.			
3.			
4.			
5.			

Test Procedure: Turn on test equipment. Set measurement equipment to proper ranges. Input BITC and record LRU status output on an Oscilloscope.

Data Reduction: Send input levels to printer and output of Oscilloscope to plotter.

Equipment List:

1.	Computer (HP-9836S)	4.	Oscilloscope (TEK-2465)	7.	
2.	Printer (HP-2671G)	5.		8.	
3.	Logic Patt. Gen. (HP-8170B)	6.		9.	


DIGITAL MULTIMETER (HP-3478B)
SERIAL DATA GENERATOR HP-8018A)
MICROWAVE COUNTER (HP-5342A)
ELECTRONIC COUNTER (HP-5385)
NOISE FIGURE METER (HP-8970A)
LOGIC PATTERN GENERATOR (HP-8170A)
RELAY ACTUATOR (HP-59306A)
TIME INTERVAL COUNTER (HP-5370B)
POWER METER (HP-436A)
DIGITAL CONTROLS
INPUT BITE
ANTENNA ELECTRONICS
LRU STATUS OUTPUT
SIGNAL GENERATOR (HP-8663A)
NETWORK ANALYZER (HP-8510A)
SWEEP GENERATOR (HP-8340A)
SPECTRUM ANALYZER (HP-8566A)
ATTENUATOR SWITCH DRIVE (HP-11713A)
FUNCTION GENERATOR (HP-8116A)
FUNCTION GENERATOR (HP-8116A)
FUNCTION GENERATOR (HP-8116A)
OSCILLOSCOPE (TEK-2465)
WINCHESTER DISC (HP-9134XV)
COMPUTER CONTROLLER (HP-98365)
PLOTTER (HP-7475A)
PRINTER (HP-2671G)

WORD FORMAT

4.0 SOFTWARE REQUIREMENTS

This section contains the software requirements for the bench test procedures defined in Section 3. These software requirements are defined in terms of flowcharts.

The software requirements contained herein are written at the functional level. There is a flowchart for each test procedure that illustrates the sequence of events that will be required in order to perform these tests by computer. In addition to these requirements, all tests will include the following:

- menu driven testing will prompt operator through:
  1. test set-ups
  2. testing
  3. data reduction/storage/hardcopy
- Each test will have a program module number and will be contained in a testing menu. All tests with the same set-up can be grouped together to be run one after the other.
- Each test will incorporate a full error-checking capability during operator inputs so that no manual error can be entered into the system.
- Data reduction based on baseline data and/or range limits. The specified range values and/or tolerance will be stored and compared to the results obtained from the actual test. The values will be displayed and any differences can quickly be seen.
- There will be real-time monitoring for any bus available information during testing.
- There will be off-line storage or transfer of data for interfacing with the DPSSF/NSL system capabilities. This capability will be used for any information that is needed for the DPSSF, NSL or RFL.

- All software will be stored including back-up disks and hardcopy listings, in a library which will contain as a minimum, the following information in its catalog:
    1. program module name and number (disk #)
    2. back-up copy # (disk #)
    3. data written, by whom
    4. date last revised, by whom

There are two floppy disk drives which have a memory of 170k each built into the computer. All information will be stored on either of these floppy disks. There is also a Winchester hard disk provided. This can be used as a temporary storage for data and information obtained while testing, if needed. For example, if a series of tests are being run and many data points are needed to be stored and all of the memory is being used in the computer, the information is stored temporarily on the Winchester disk until processing is complete and then archived onto the floppy disks.

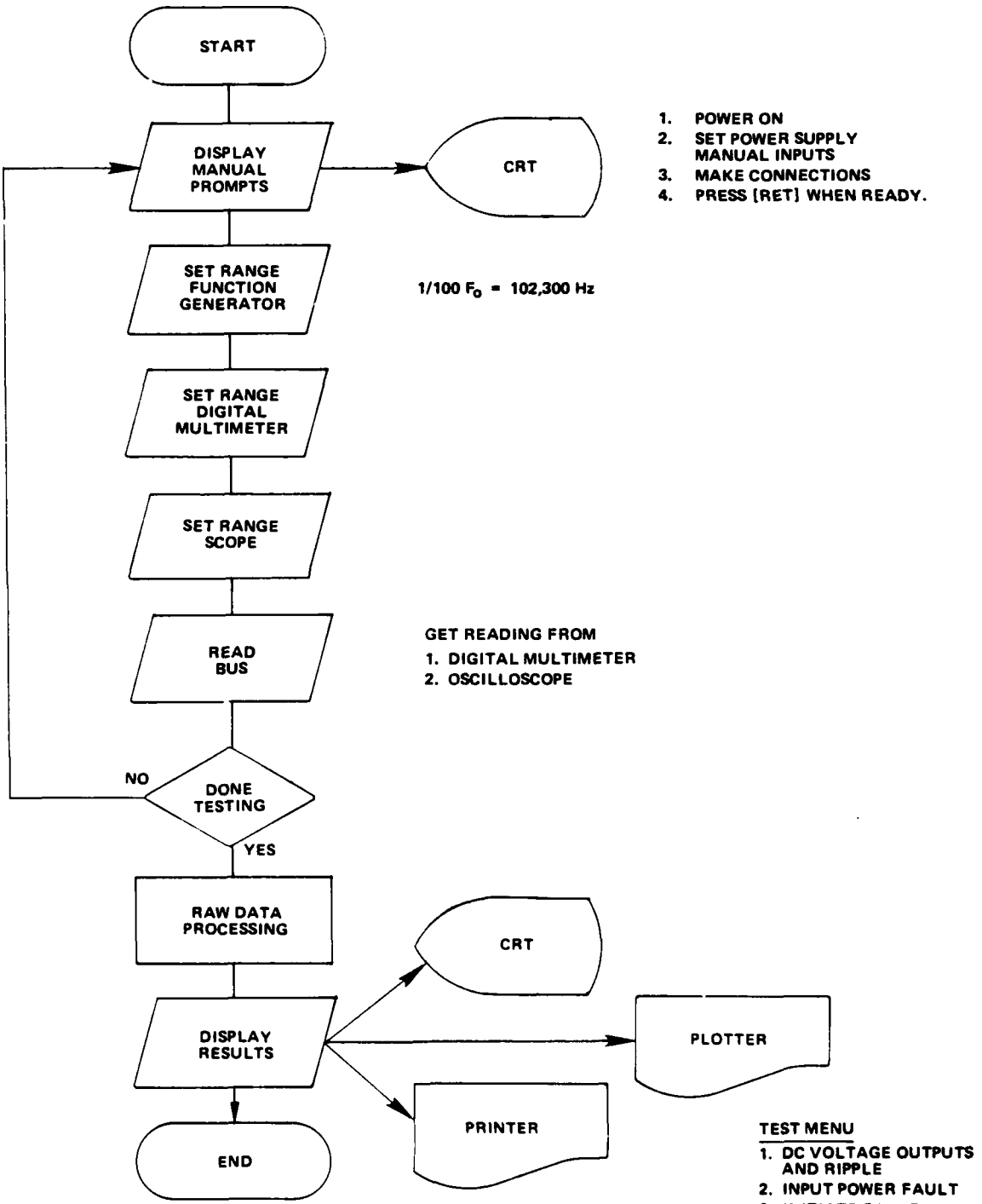
4.1 ROCKWELL-COLLINS SOFTWARE REQUIREMENTS

The following sheets contain the software requirements for the Bench Test Procedures for each of the boards identified in section 3.1. The software requirements will also be refined and expanded as more detailed information becomes available for the bench tests.

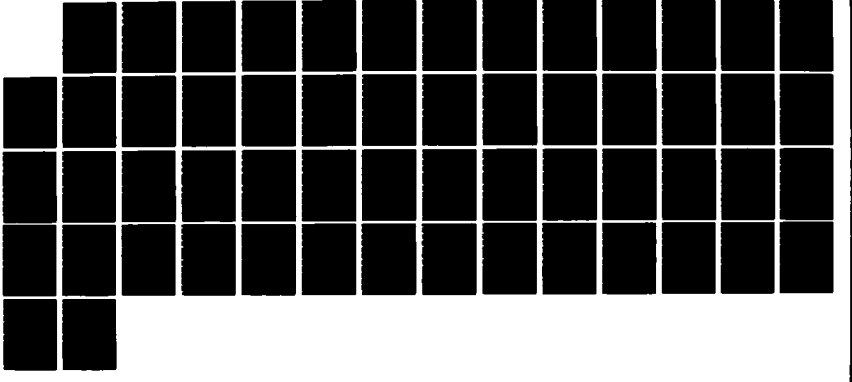
4.1.1 POWER SUPPLY MODULE

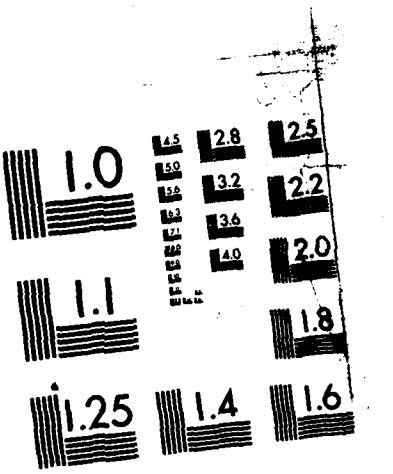
POWER SUPPLY MEASUREMENTS

PROGRAM MODULE NUMBER: _____



AD-A166 498 UE BENCH TEST PLANS AND REQUIREMENTS VOLUME 2 3/3
ROCKWELL-COLLINS UE SET(U) ESSCUBE ENGINEERING INC
MARLTON NJ SEP 84 CEA/GPS-85-156-00-030-VOL-2
UNCLASSIFIED N62269-82-D-0059 F/G 14/2 NL



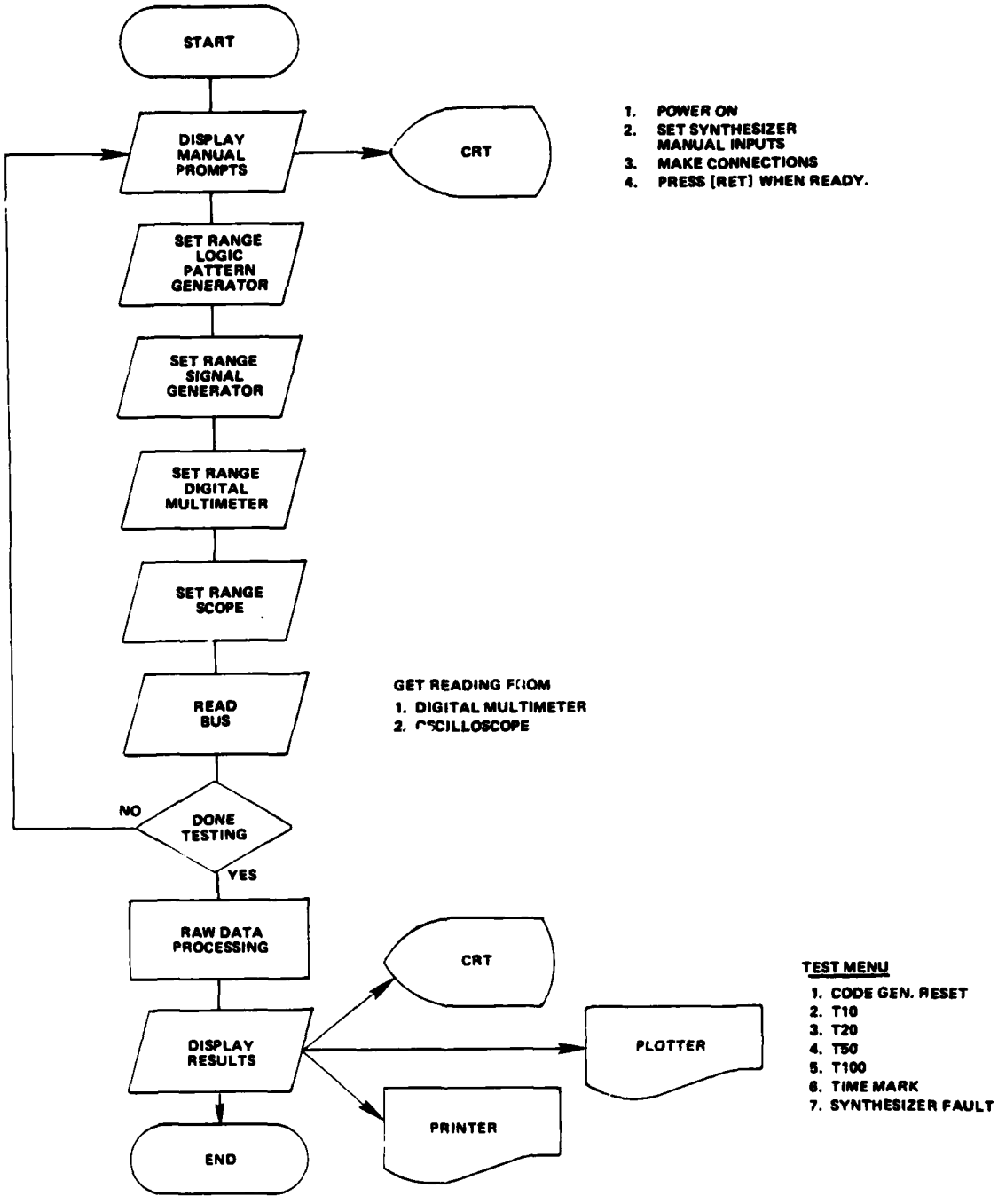


MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS 1963 A

4.1.2 RF SYNTHESIZER MODULE

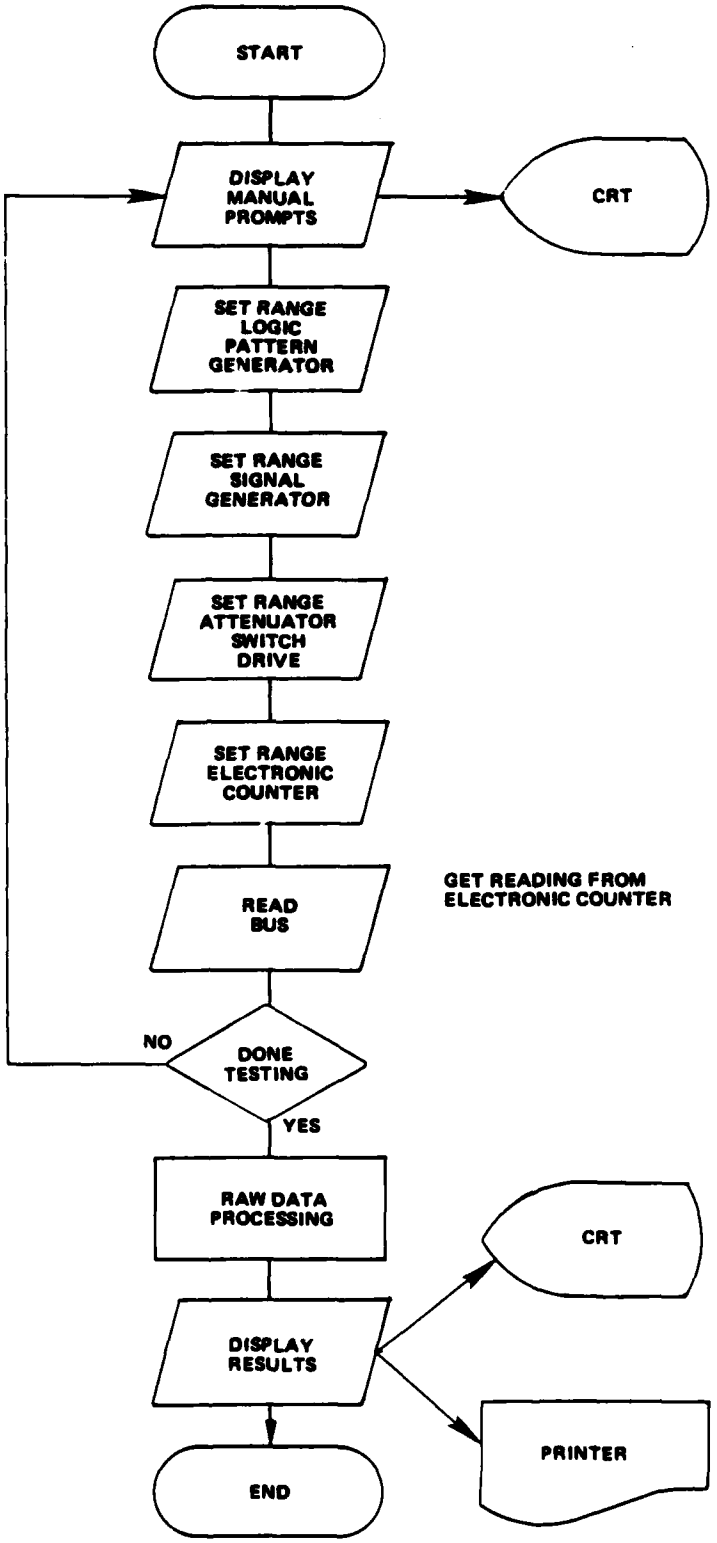
VERIFY OPERATION OF DIGITAL CONTROL SIGNALS

PROGRAM MODULE NAME: _____



OUTPUT FREQUENCY MEASUREMENT

PROGRAM MODULE NAME: _____



1. POWER ON
2. SET SYNTHESIZER MANUAL INPUTS
3. MAKE CONNECTIONS
4. PRESS [RET] WHEN READY.

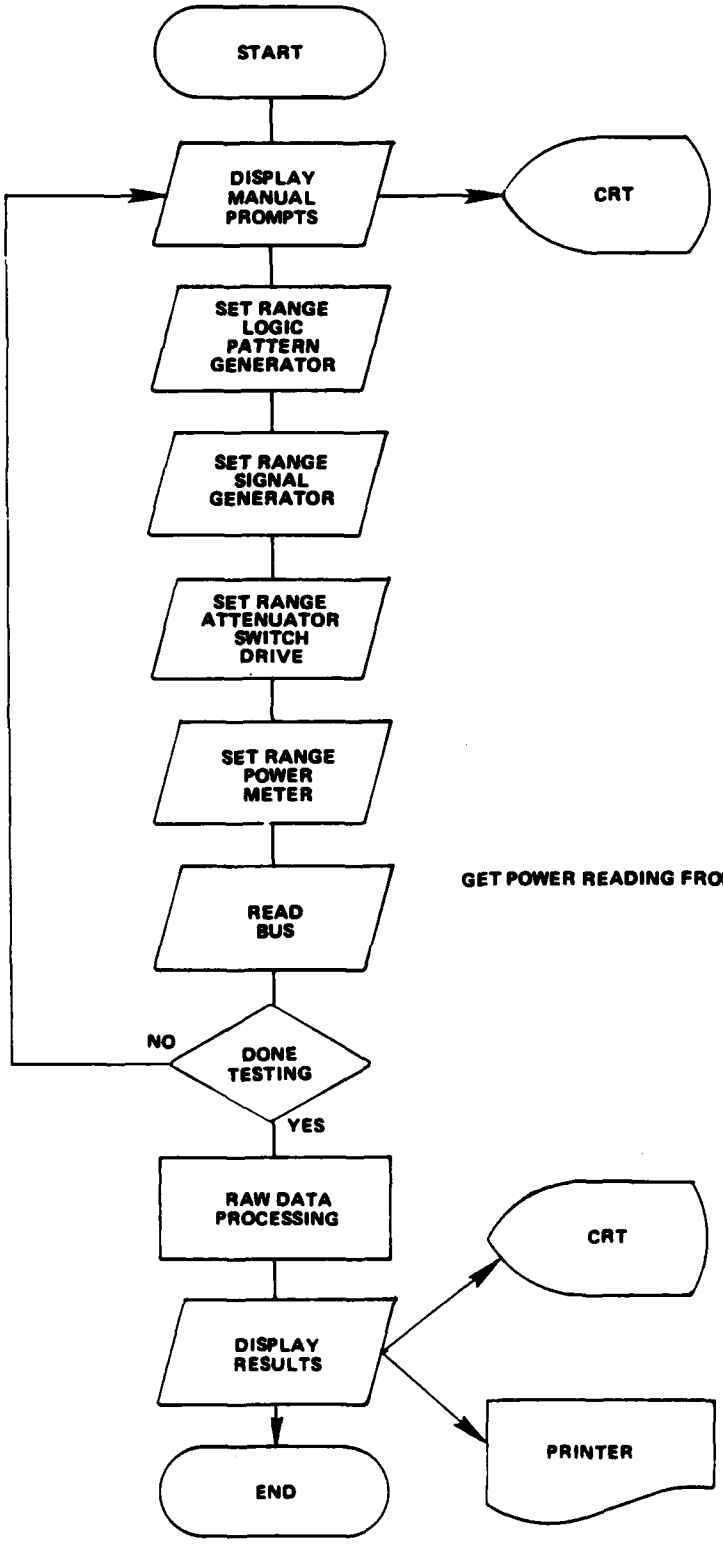
GET READING FROM ELECTRONIC COUNTER

TEST MENU

1. BIT F_o
2. EXT F_o
3. (137/16-2/15) F_o
4. 137/4 F_o
5. 137/16 F_o
6. 4/15 F_o
7. 1/2 F_o
8. 1/4 F_o
9. 1/40 F_o
10. 1/100 F_o

OUTPUT POWER MEASUREMENT

PROGRAM MODULE NAME:



1. POWER ON
2. SET CONVERTER/SWITCHER MANUAL INPUTS
3. MAKE CONNECTIONS
4. PRESS [RET] WHEN READY.

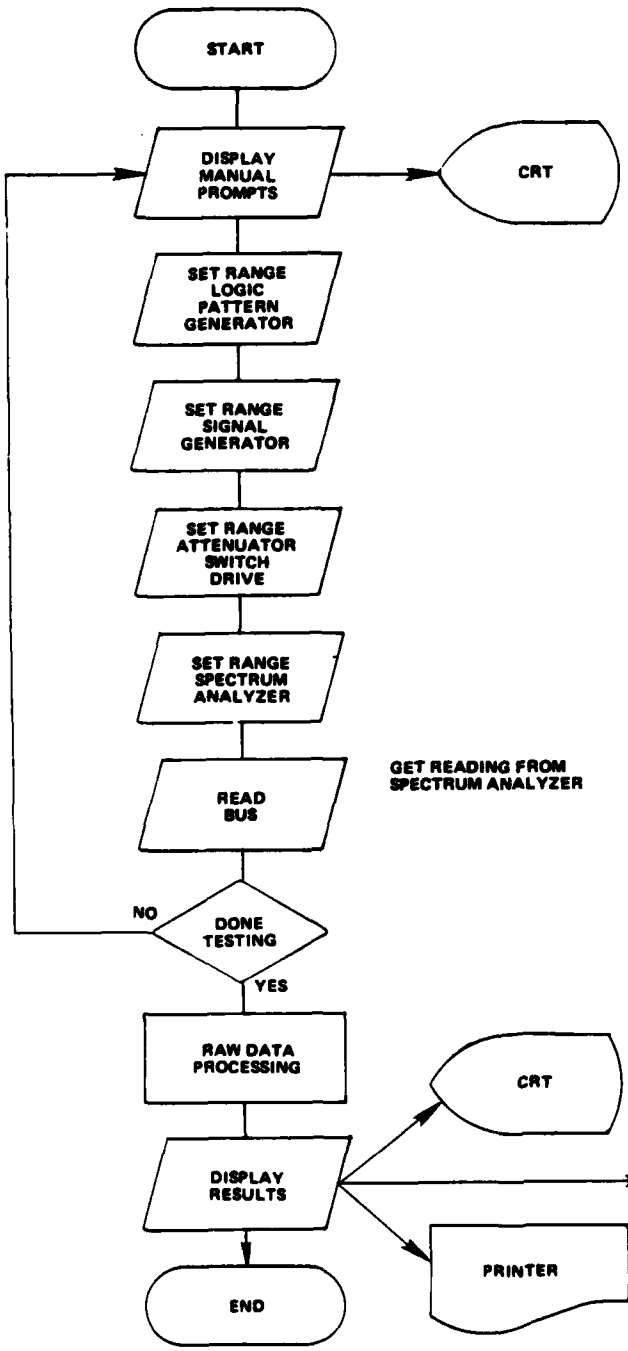
GET POWER READING FROM POWER METER

TEST MENU

1. BIT F_o
2. EXT F_o
3. (137/16-2/15 F_o
4. 137/4 F_o
5. 137/16 F_o
6. 4/15 F_o
7. 1/2 F_o
8. 1/4 F_o
9. 1/40 F_o
10. 1/100 F_o

MEASURE SPECTRAL CONTENT

PROGRAM MODULE NAME: _____



1. POWER ON
2. SET SYNTHESIZER MANUAL INPUTS
3. MAKE CONNECTIONS
4. PRESS [RET] WHEN READY.

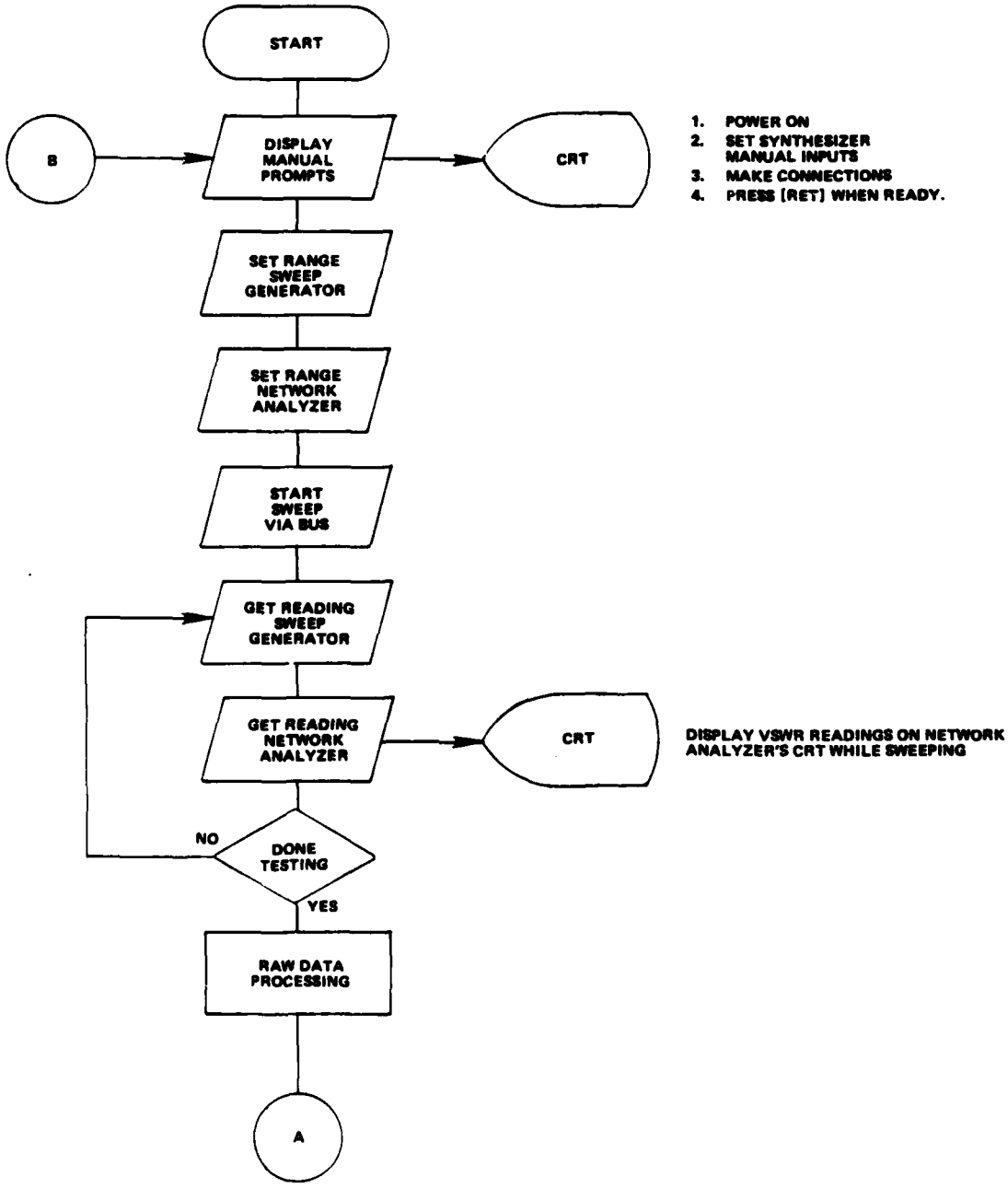
GET READING FROM SPECTRUM ANALYZER

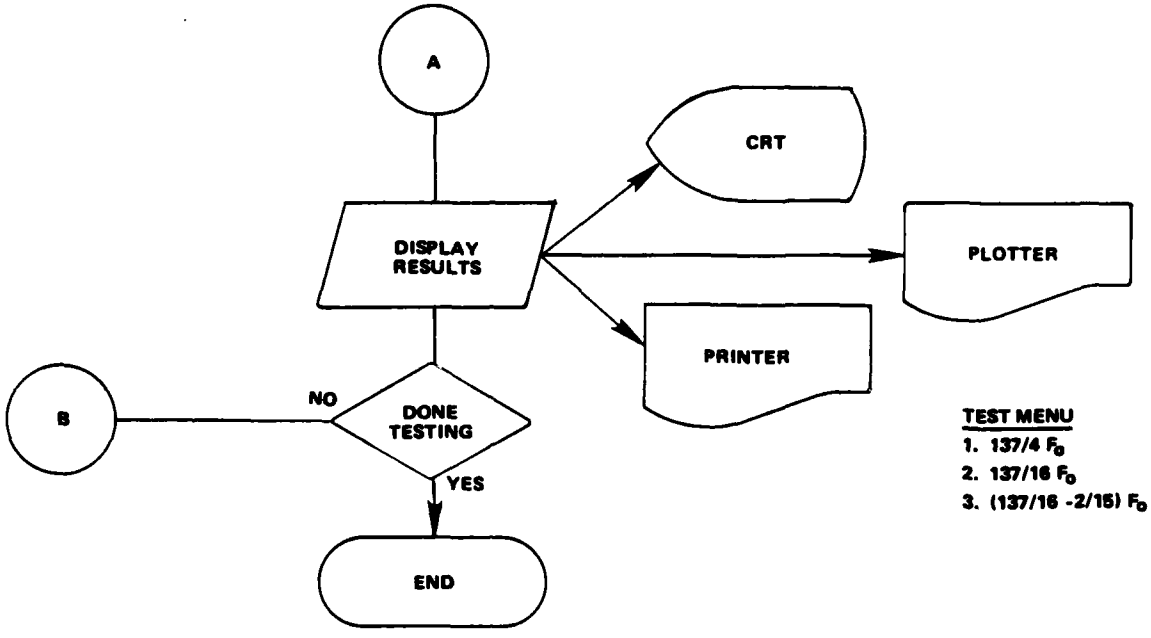
TEST MENU

1. BIT F_0
2. EXT F_0
3. (137/16-2/15) F_0
4. 137/4 F_0
5. 137/16 F_0
6. 4/15 F_0
7. 1/2 F_0
8. 1/4 F_0
9. 1/40 F_0
10. 1/100 F_0

VSWR AND IMPEDANCE MEASUREMENT

PROGRAM MODULE NAME: _____

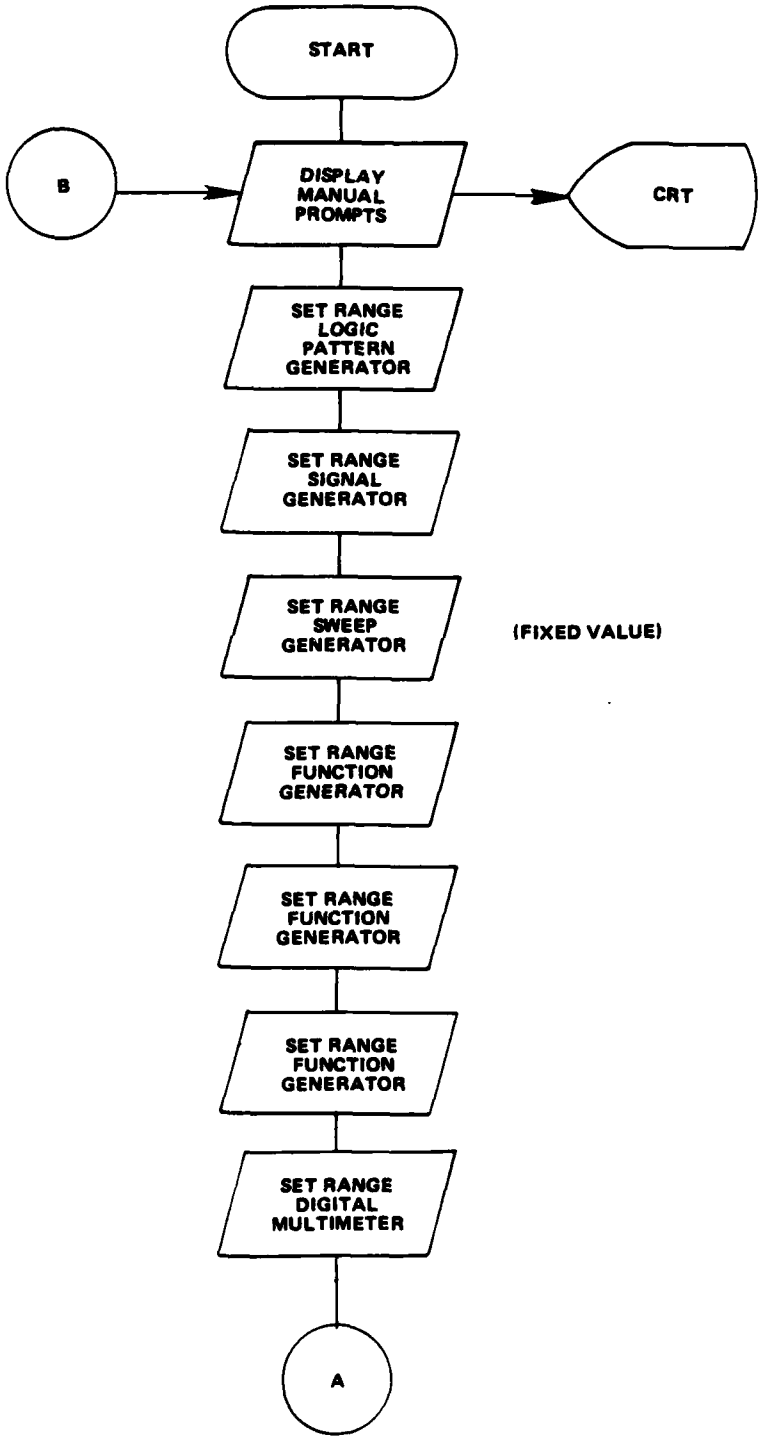



A
CRT
DISPLAY RESULTS
PLOTTER
PRINTER
B
NO
DONE TESTING
YES
END
TEST MENU
1. 137/4 F_0
2. 137/16 F_0
3. (137/16 -2/15) F_0

4.1.3 CORRELATOR MODULE

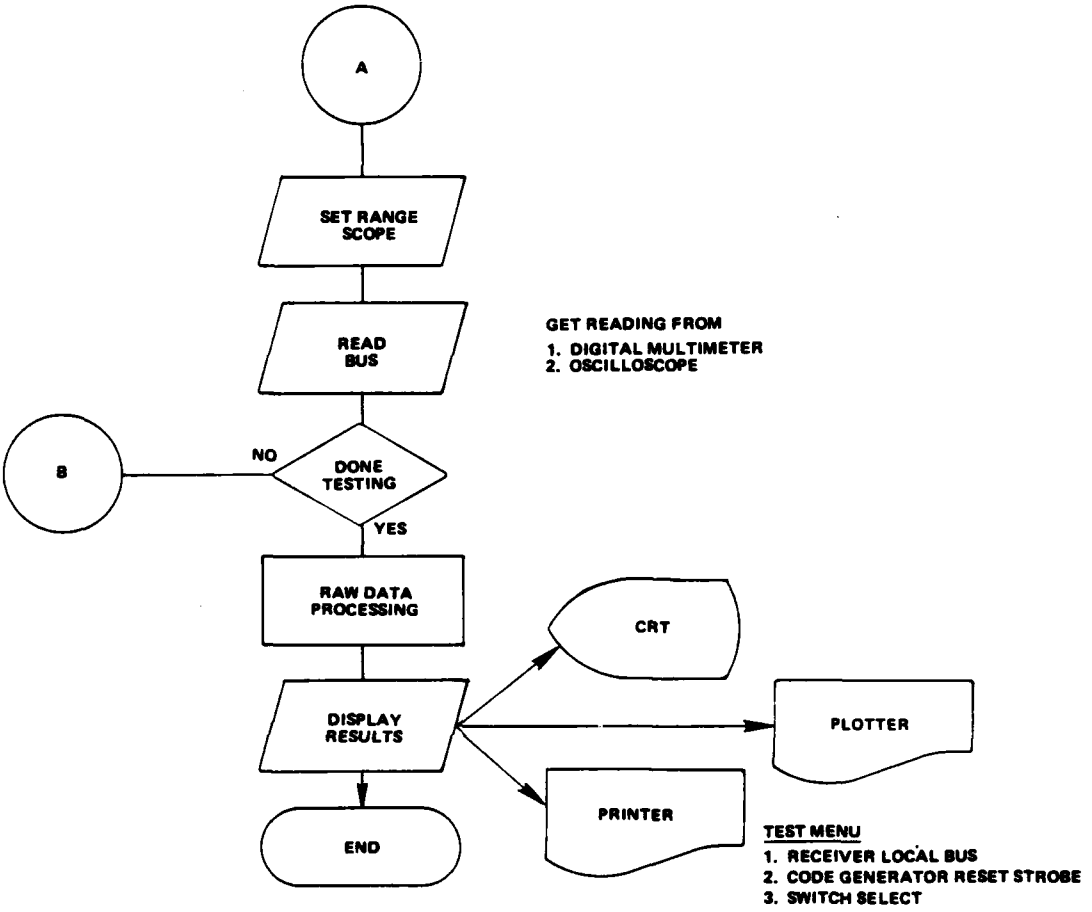
CORRELATOR DIGITAL SIGNALS

PROGRAM MODULE NAME: _____



1. POWER ON
2. SET CORRELATOR MANUAL INPUTS
3. MAKE CONNECTIONS
4. PRESS [RET] WHEN READY.

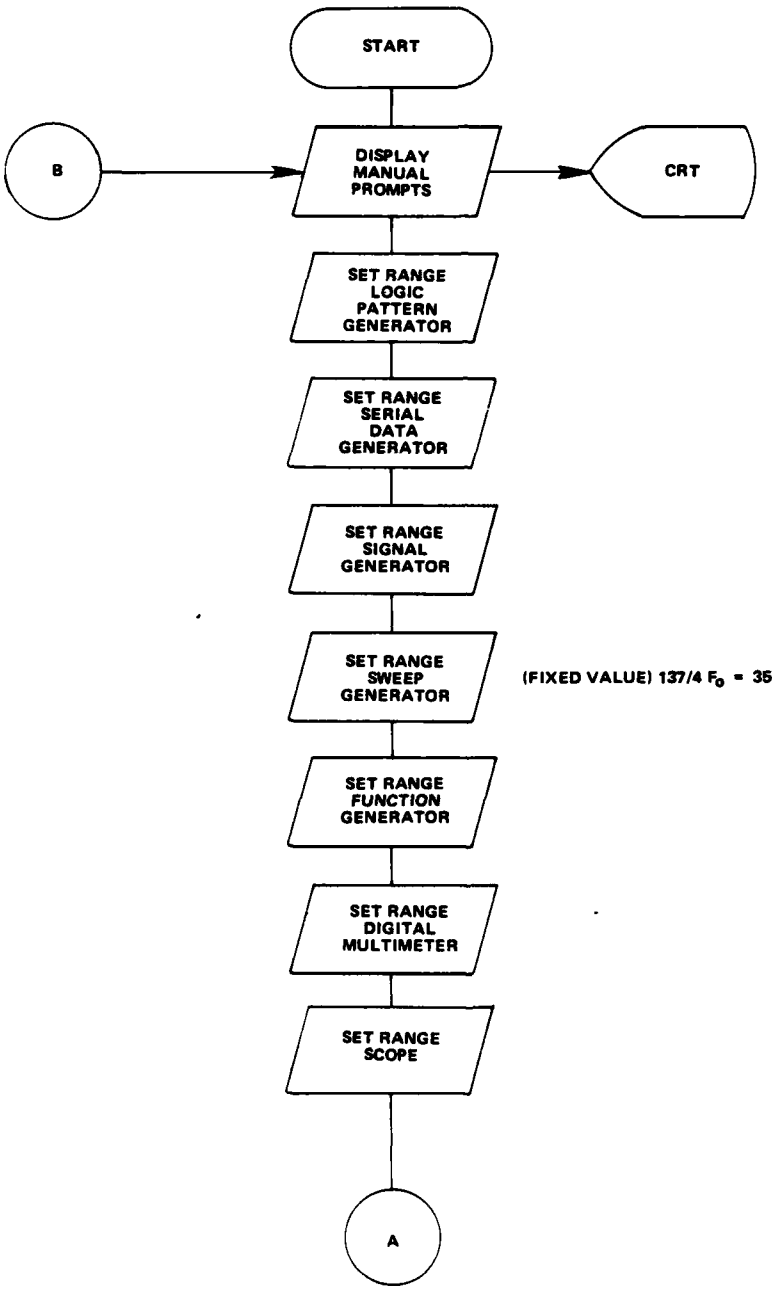
(FIXED VALUE)

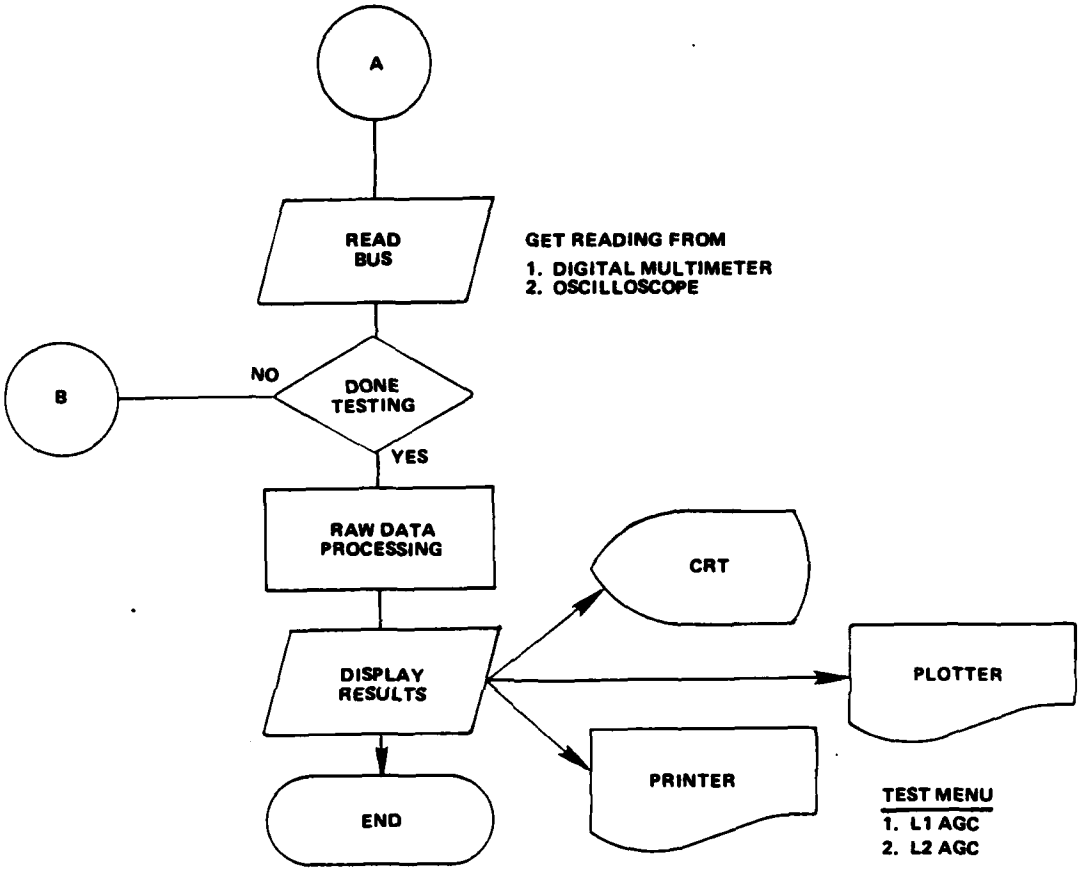

A
SET RANGE SCOPE
READ BUS
GET READING FROM
1. DIGITAL MULTIMETER
2. OSCILLOSCOPE
B
NO
DONE TESTING
YES
RAW DATA PROCESSING
CRT
DISPLAY RESULTS
PLOTTER
PRINTER
END
TEST MENU
1. RECEIVER LOCAL BUS
2. CODE GENERATOR RESET STROBE
3. SWITCH SELECT

4.1.4 IF PROCESSOR MODULE

AGC MEASUREMENT

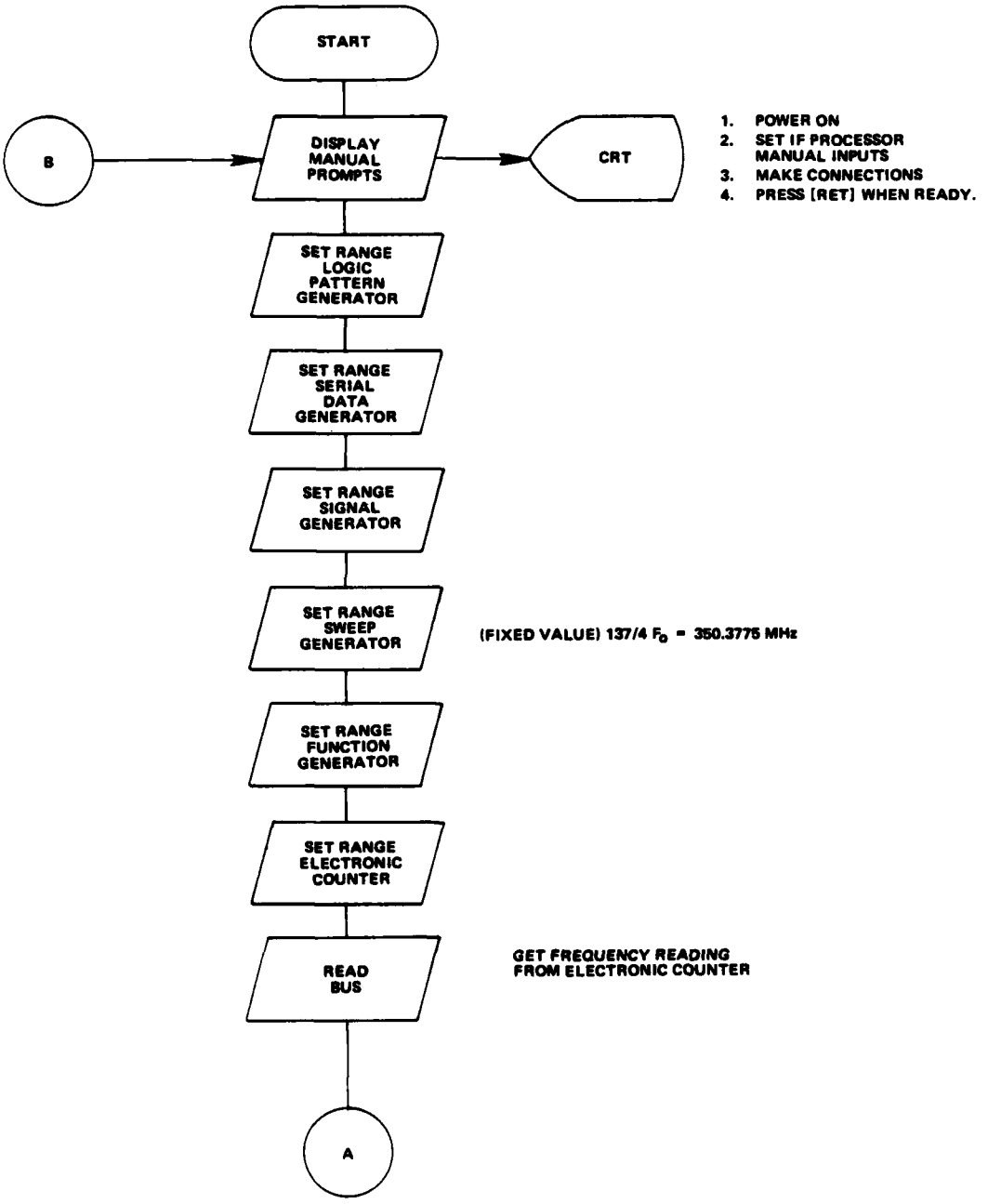
PROGRAM MODULE NAME: _____

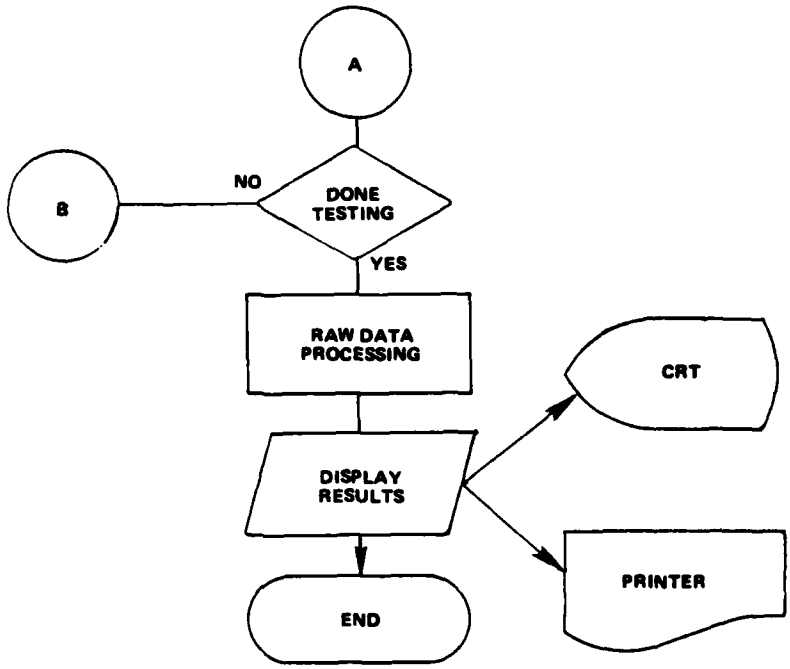



A
READ BUS
GET READING FROM
1. DIGITAL MULTIMETER
2. OSCILLOSCOPE
B
NO
DONE TESTING
YES
RAW DATA PROCESSING
CRT
DISPLAY RESULTS
PLOTTER
PRINTER
END
TEST MENU
1. L1 AGC
2. L2 AGC

17F(IF) FREQUENCY MEASUREMENT

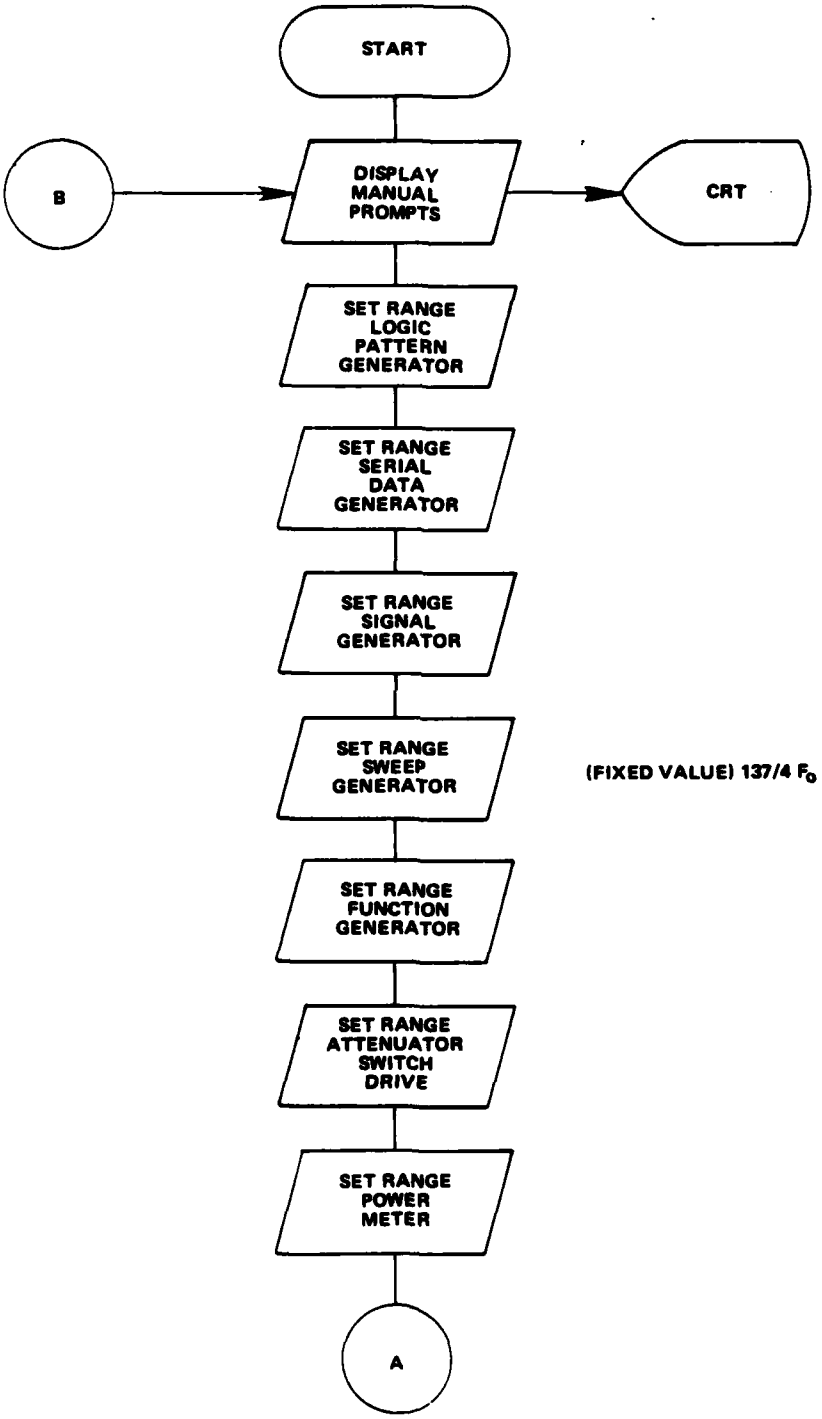
PROGRAM MODULE NAME: _____



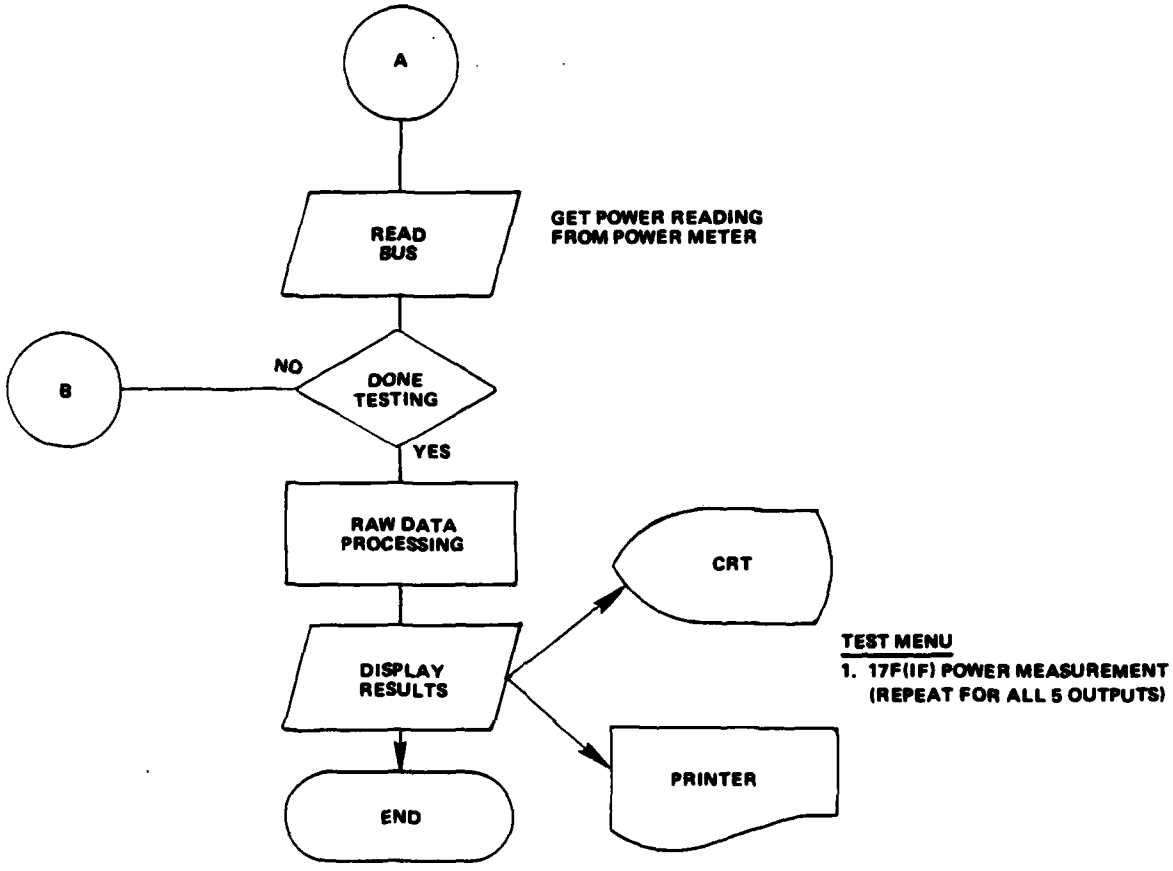

A
B
NO
DONE TESTING
YES
RAW DATA PROCESSING
DISPLAY RESULTS
END
CRT
PRINTER
TEST MENU
1. 17F(IF) FREQUENCY MEASUREMENT
(REPEAT FOR ALL 5 OUTPUTS)

17F(IF) POWER MEASUREMENT

PROGRAM MODULE NAME: _____

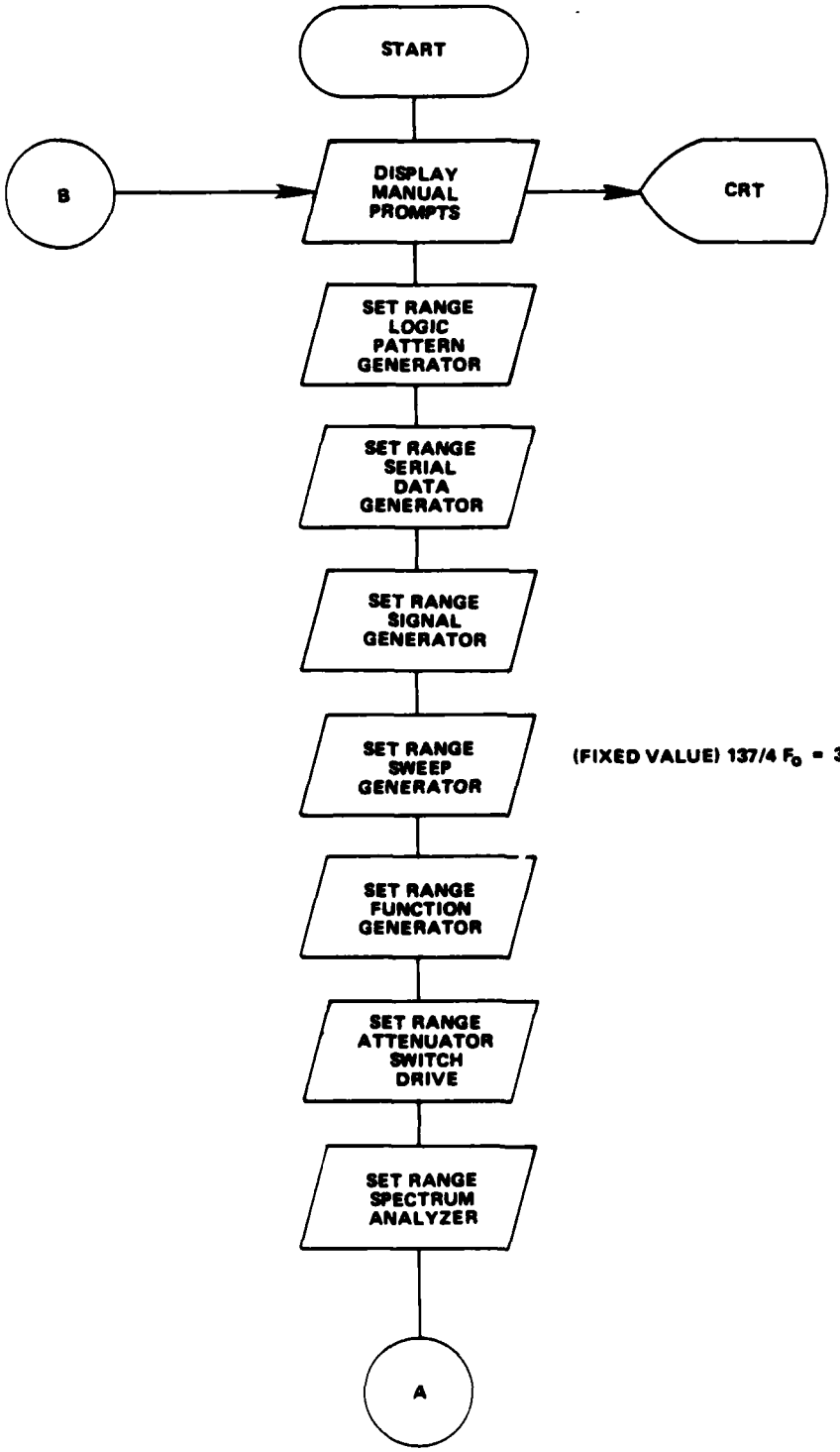


(FIXED VALUE) 137/4 F_0 = 350.3775 MHz


A
READ BUS
GET POWER READING FROM POWER METER
B
NO
DONE TESTING
YES
RAW DATA PROCESSING
CRT
DISPLAY RESULTS
TEST MENU
1. 17F(IF) POWER MEASUREMENT
(REPEAT FOR ALL 5 OUTPUTS)
PRINTER
END

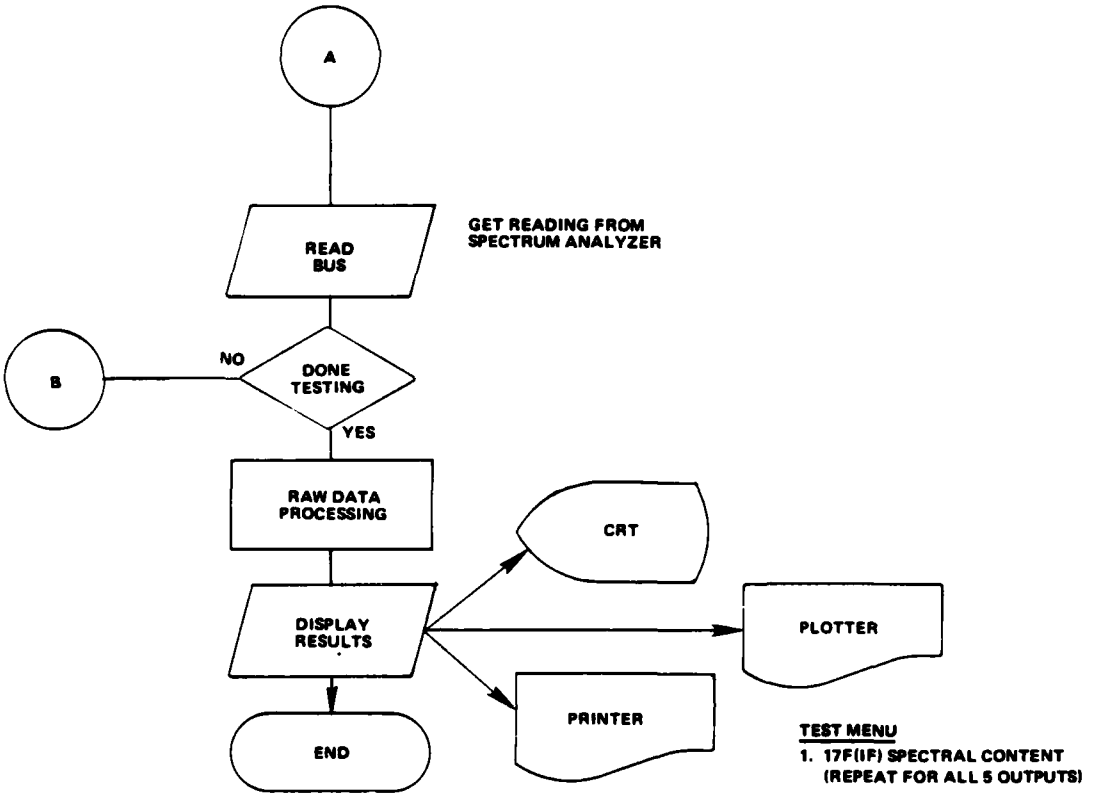
17F(IF) SPECTRAL CONTENT

PROGRAM MODULE NAME: _____



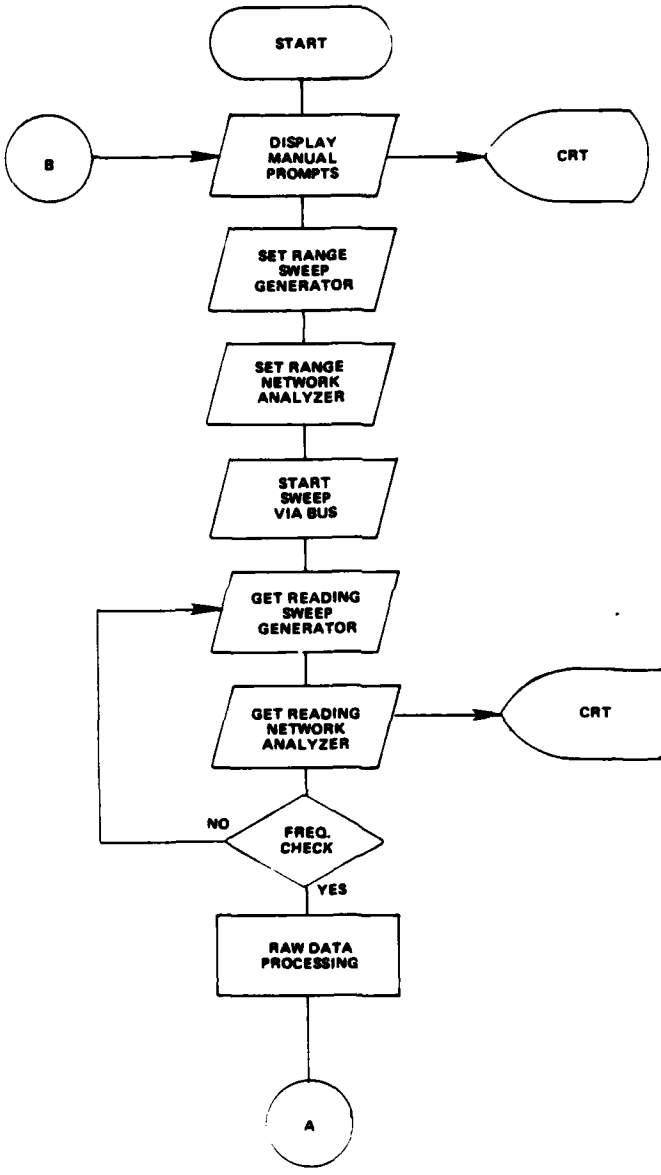
1. POWER ON
2. SET IF PROCESSOR MANUAL INPUTS
3. MAKE CONNECTIONS
4. PRESS [RET] WHEN READY.

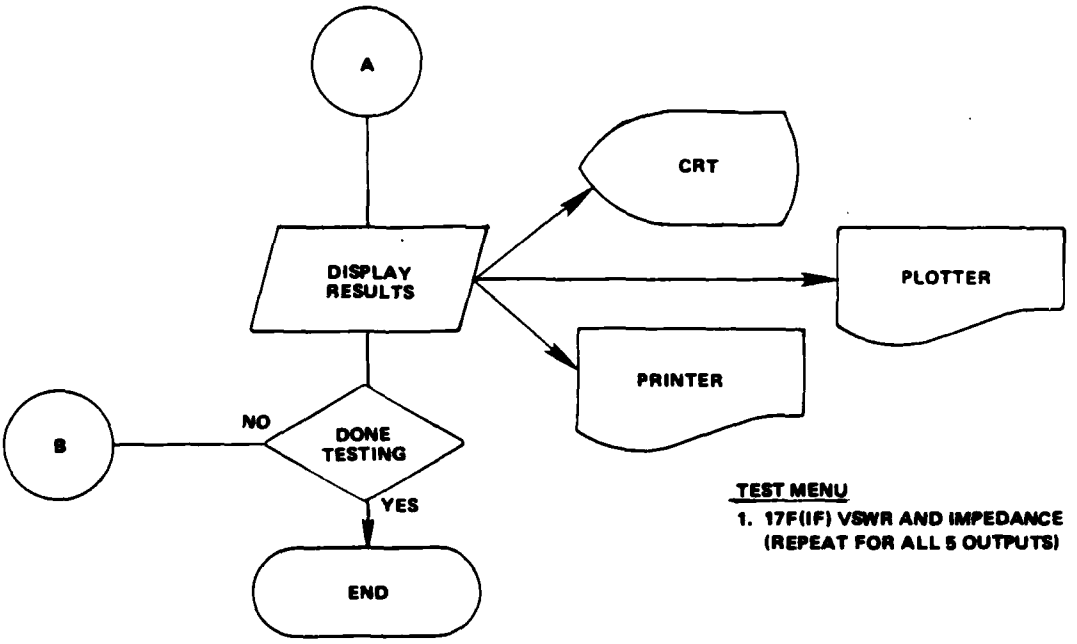
(FIXED VALUE) 137/4 F_o = 350.3775 MHz


A
READ BUS
GET READING FROM SPECTRUM ANALYZER
B
NO
DONE TESTING
YES
RAW DATA PROCESSING
CRT
DISPLAY RESULTS
PLOTTER
PRINTER
END
TEST MENU
1. 17F(IF) SPECTRAL CONTENT
(REPEAT FOR ALL 5 OUTPUTS)

17F(IF) VSWR AND IMPEDANCE MEASUREMENT

PROGRAM MODULE NAME: _____



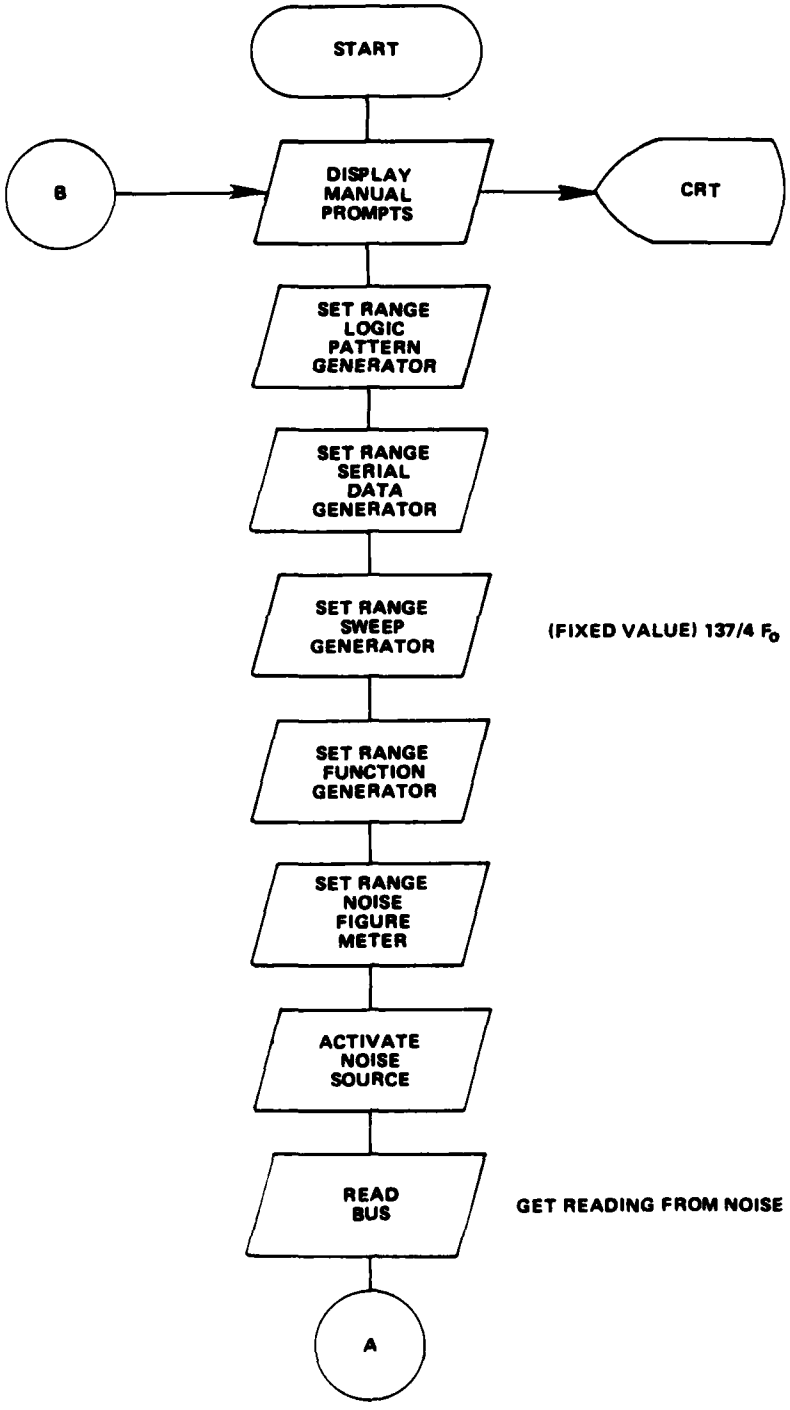


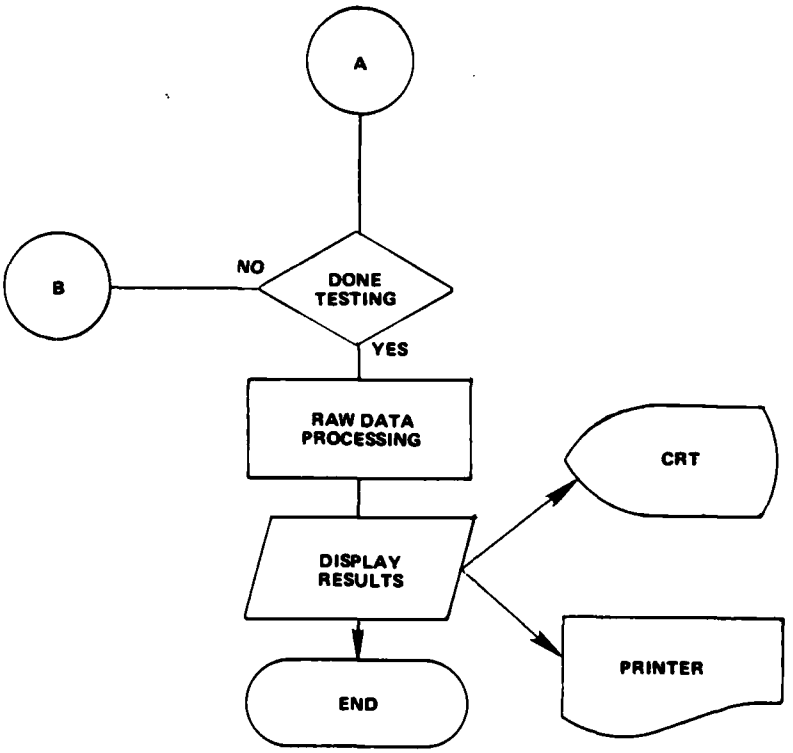
TEST MENU

1. 17F(IF) VSWR AND IMPEDANCE (REPEAT FOR ALL 5 OUTPUTS)

17F(IF) NOISE FIGURE MEASUREMENT

PROGRAM MODULE NAME: _____





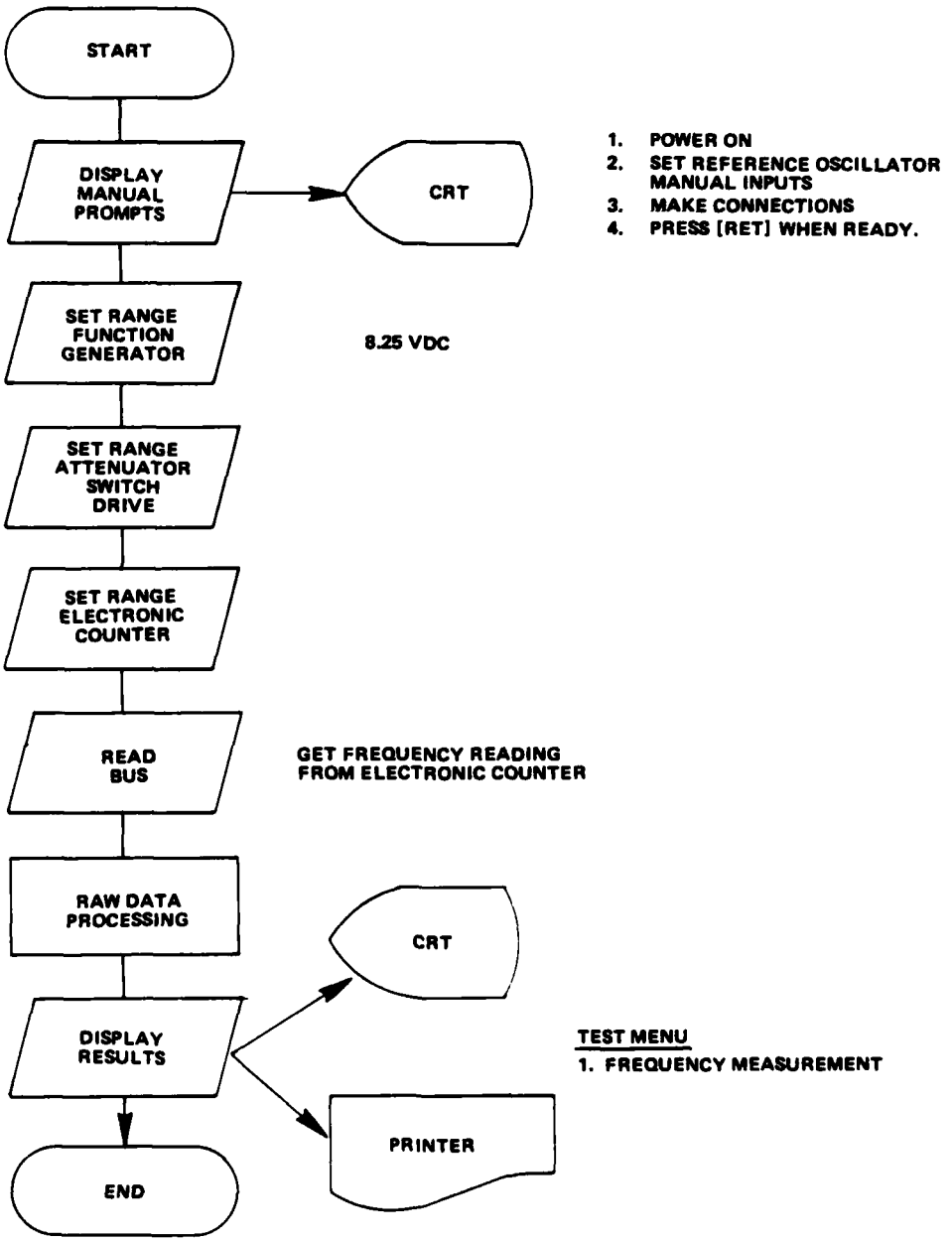
TEST MENU

1. 17F(IF) NOISE FIGURES
   (REPEAT FOR ALL 5 OUTPUTS)

4.1.5 REFERENCE OSCILLATOR MODULE

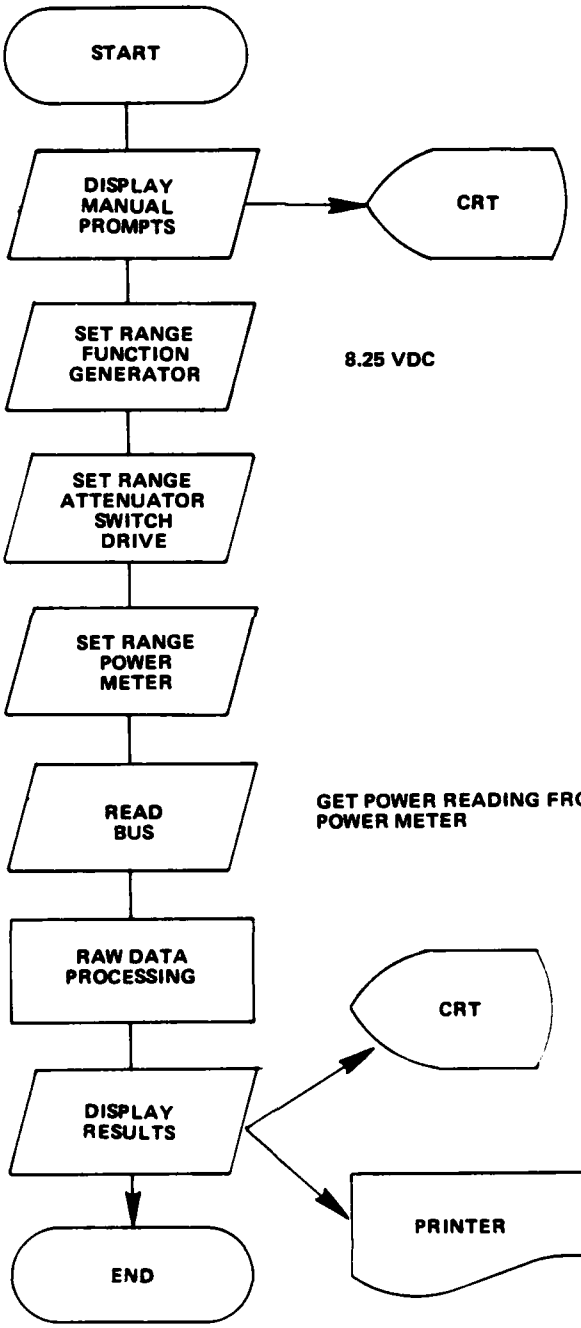
FREQUENCY MEASUREMENT

PROGRAM MODULE NAME: _____



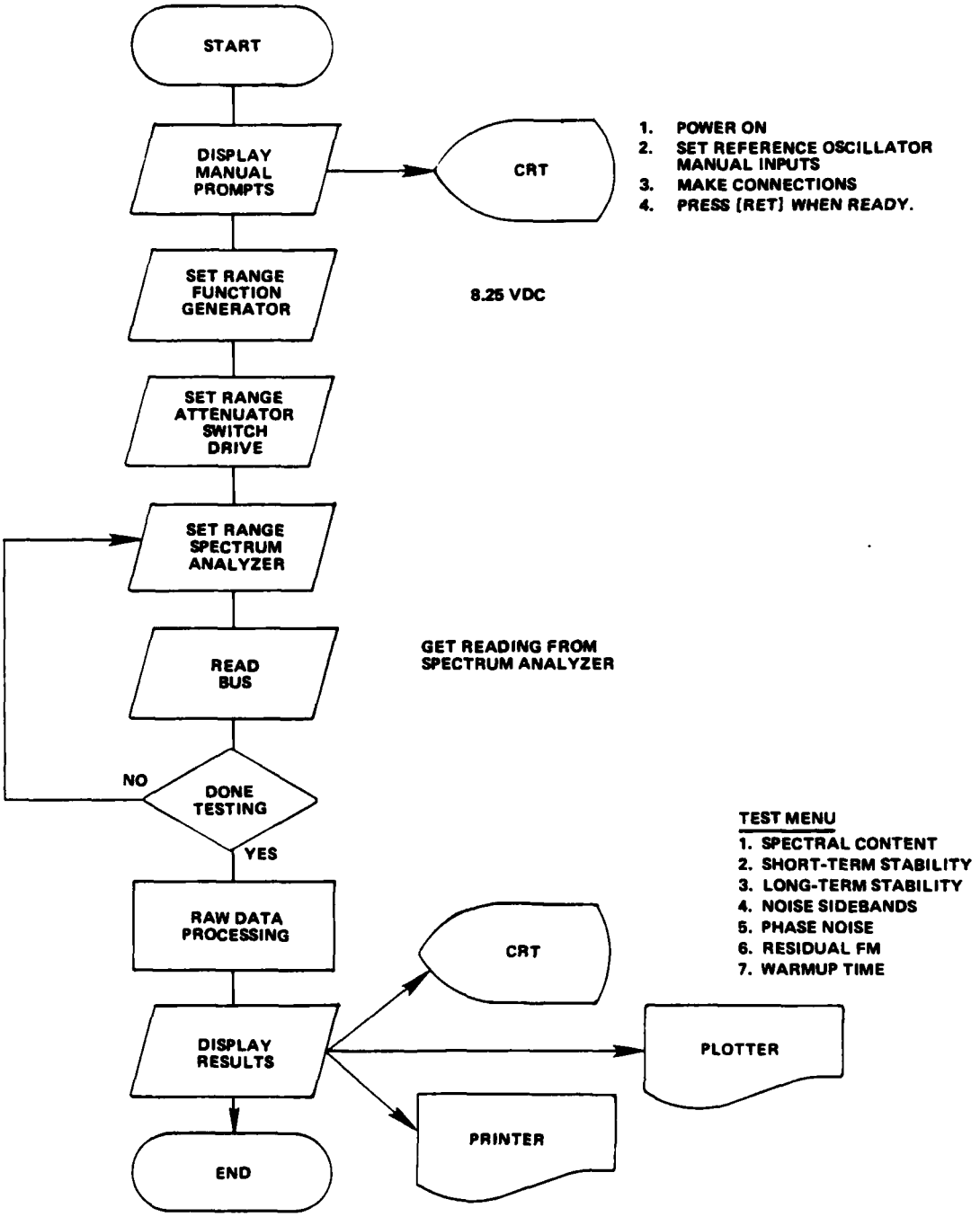
POWER MEASUREMENT

PROGRAM MODULE NAME: _____



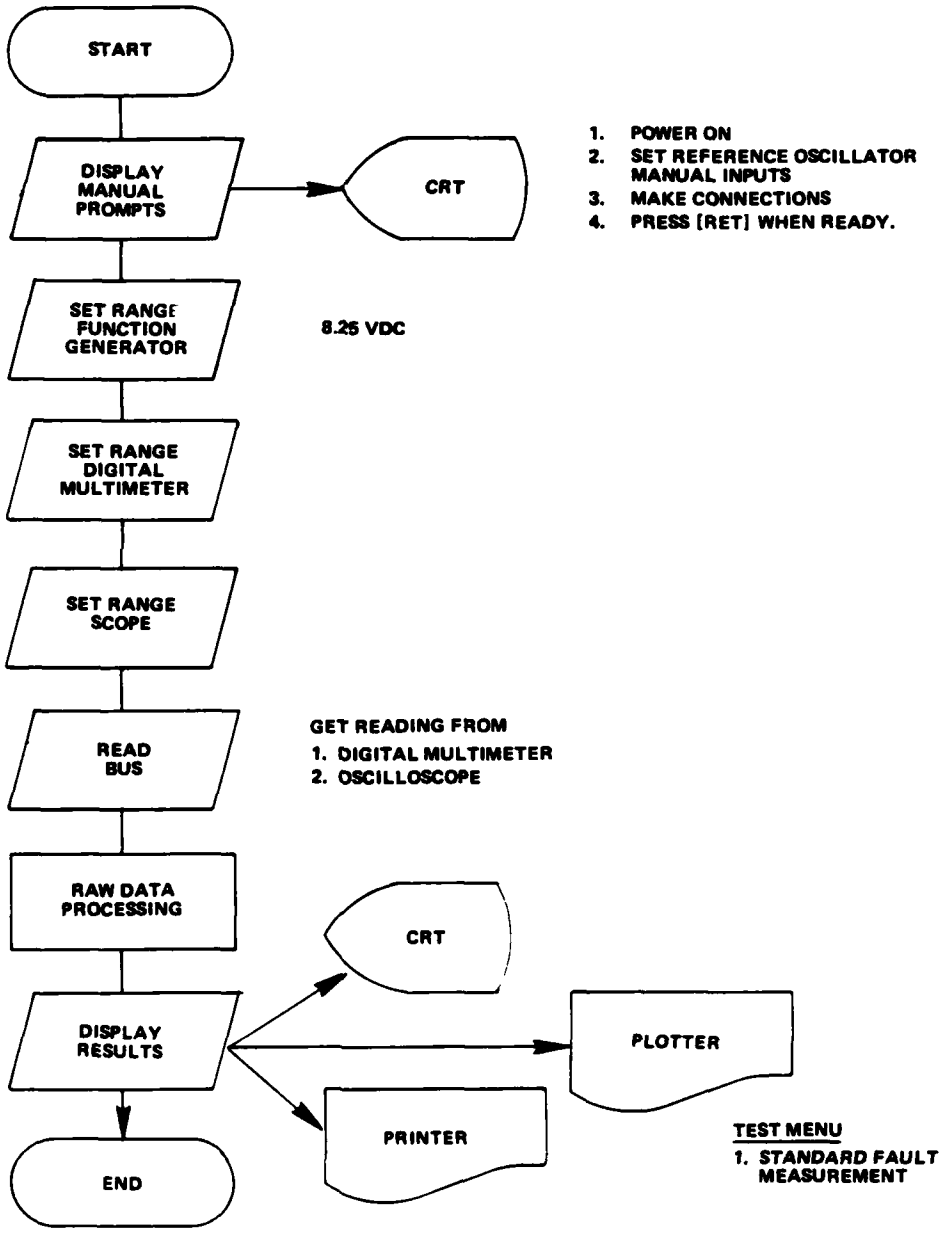
SPECTRAL CONTENT MEASUREMENTS

PROGRAM MODULE NAME: _____



VERIFY STANDARD FAULT

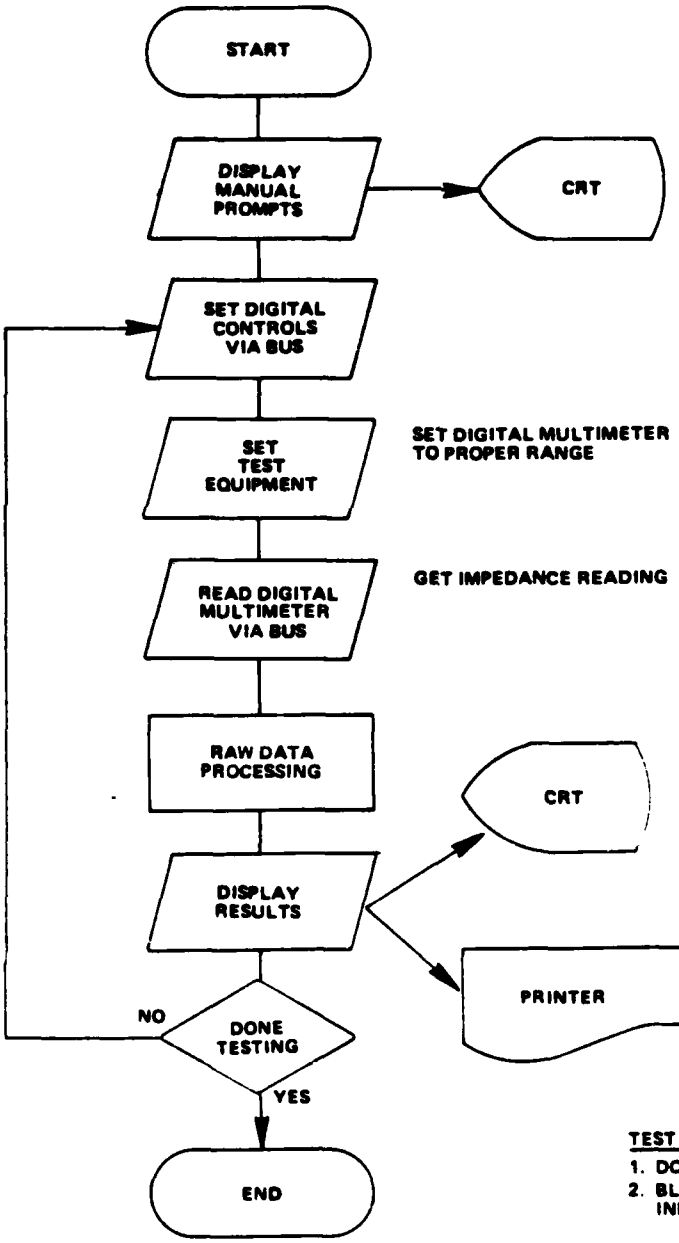
PROGRAM MODULE NAME: _____



4.1.6 ANTENNA ELECTRONICS

DC IMPEDANCE AND BLANKING PULSE INPUT IMPEDANCE

PROGRAM MODULE NAME: _____

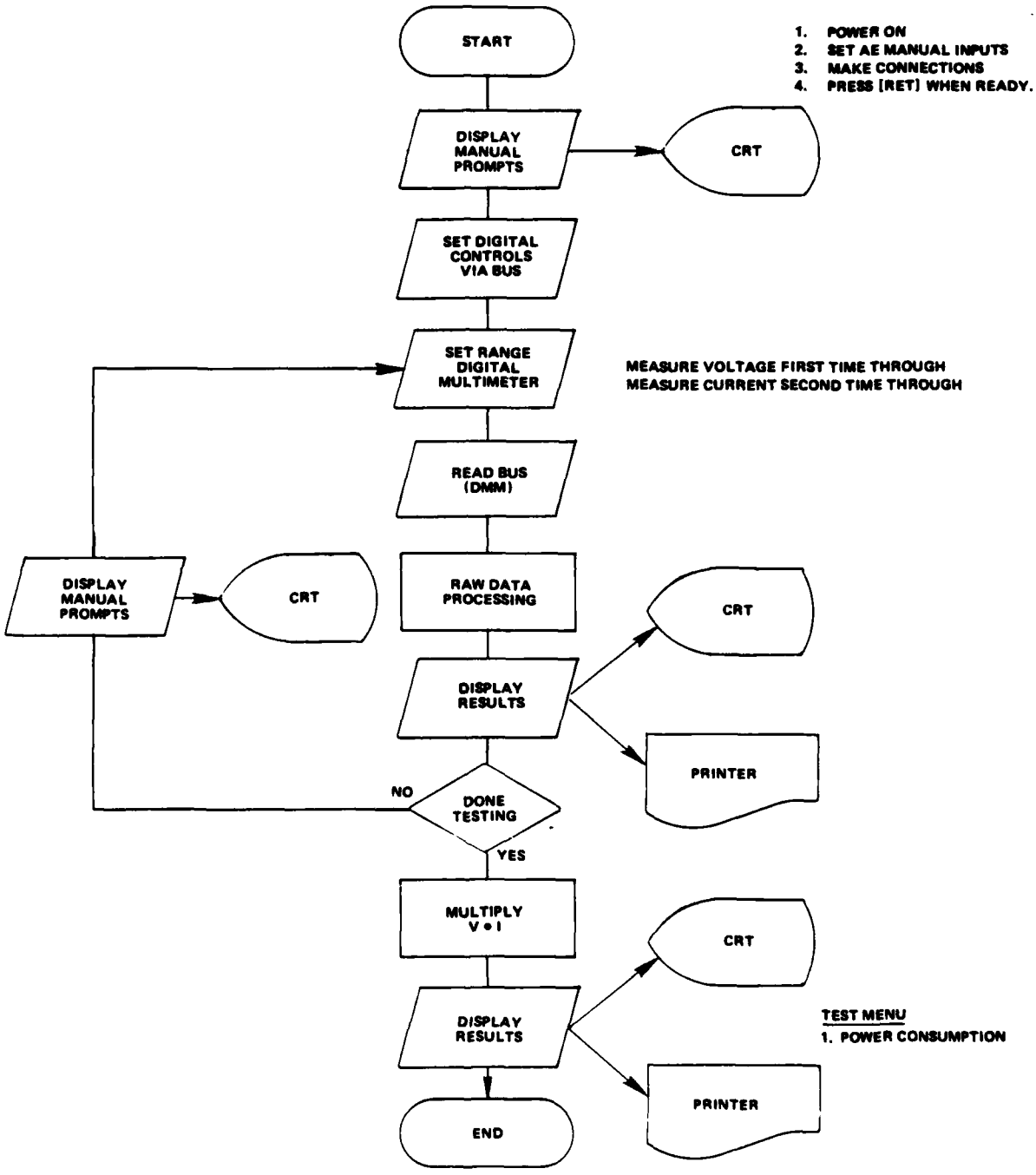


TEST MENU

1. DC IMPEDANCE
2. BLANKING PULSE INPUT IMPEDANCE

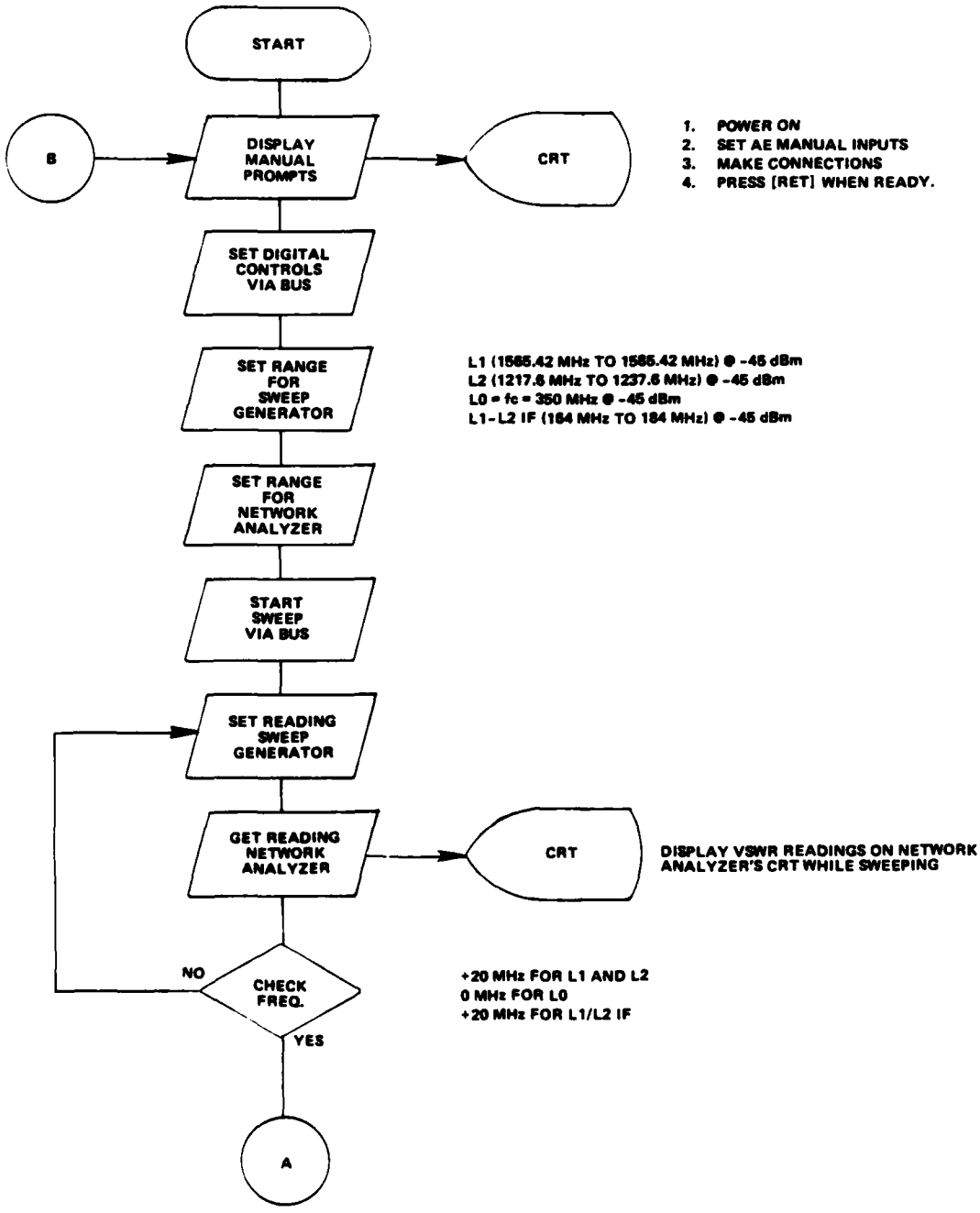
POWER CONSUMPTION

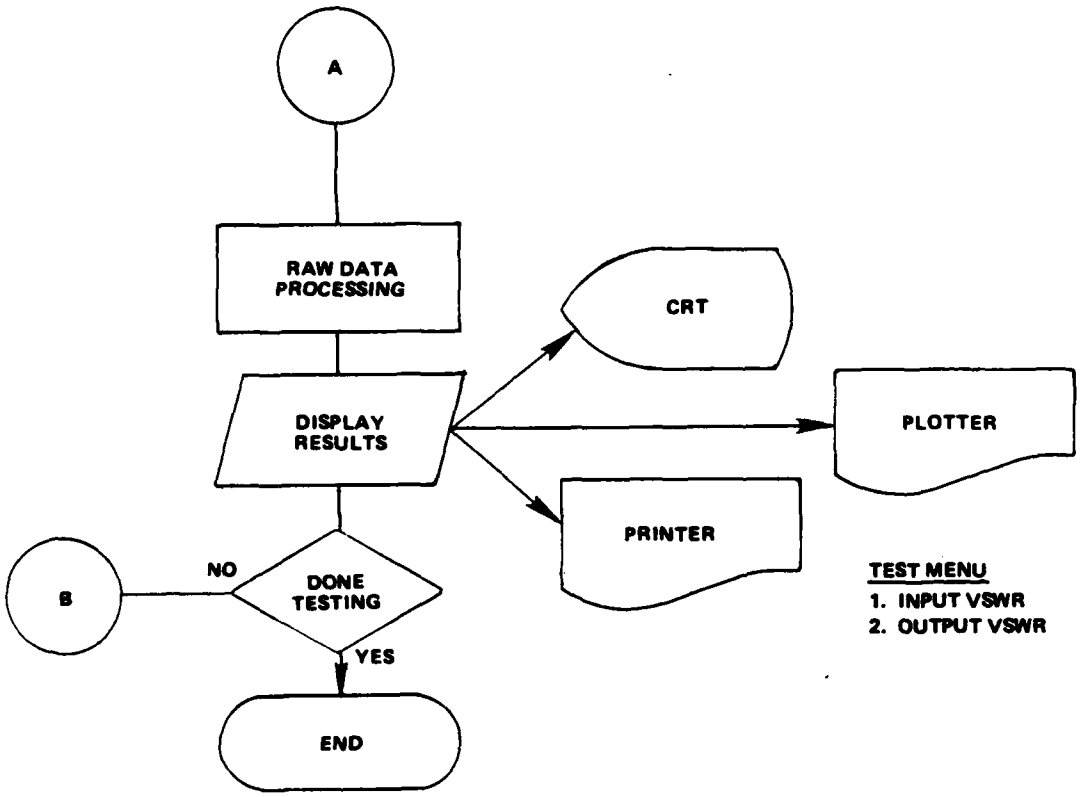
PROGRAM MODULE NAME: _____



INPUT/OUTPUT VSWR

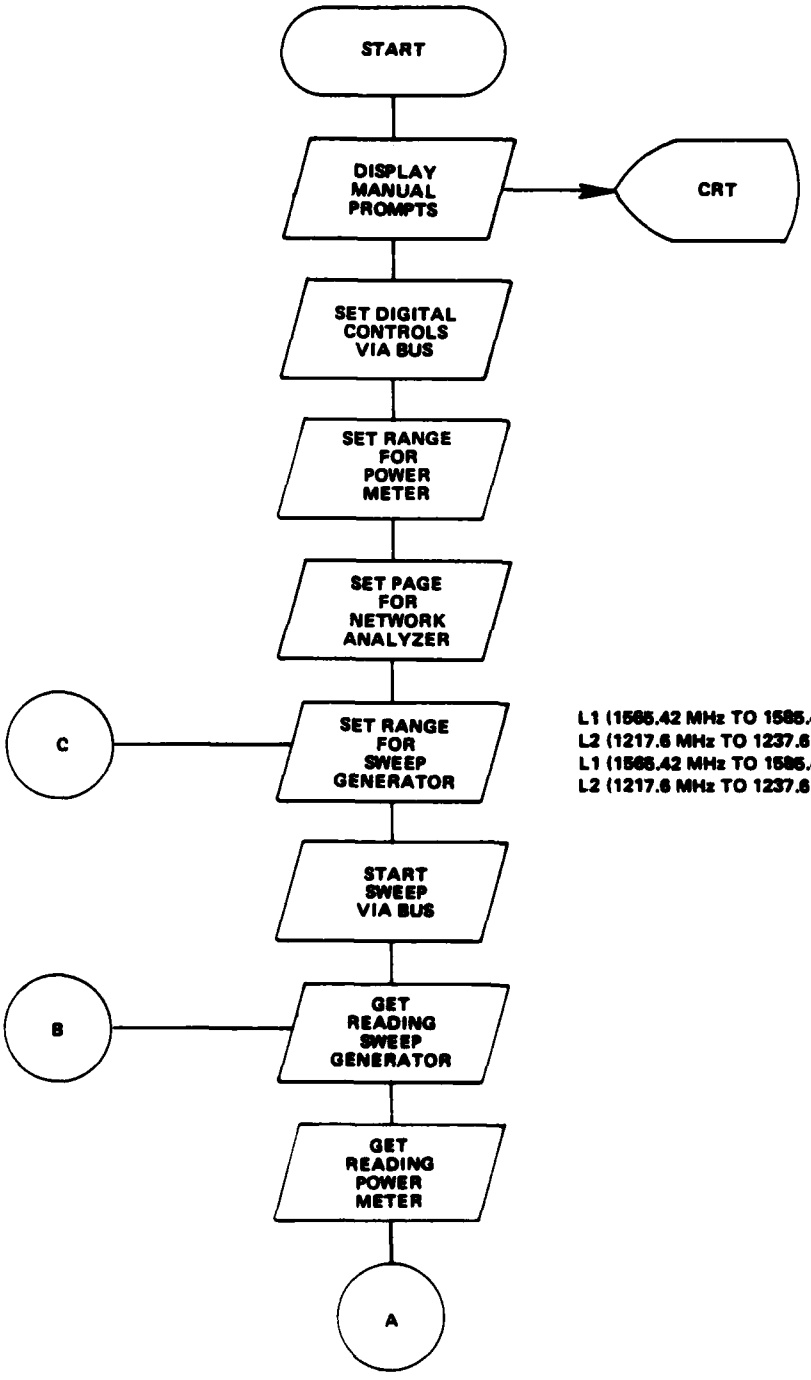
PROGRAM MODULE NAME: _____

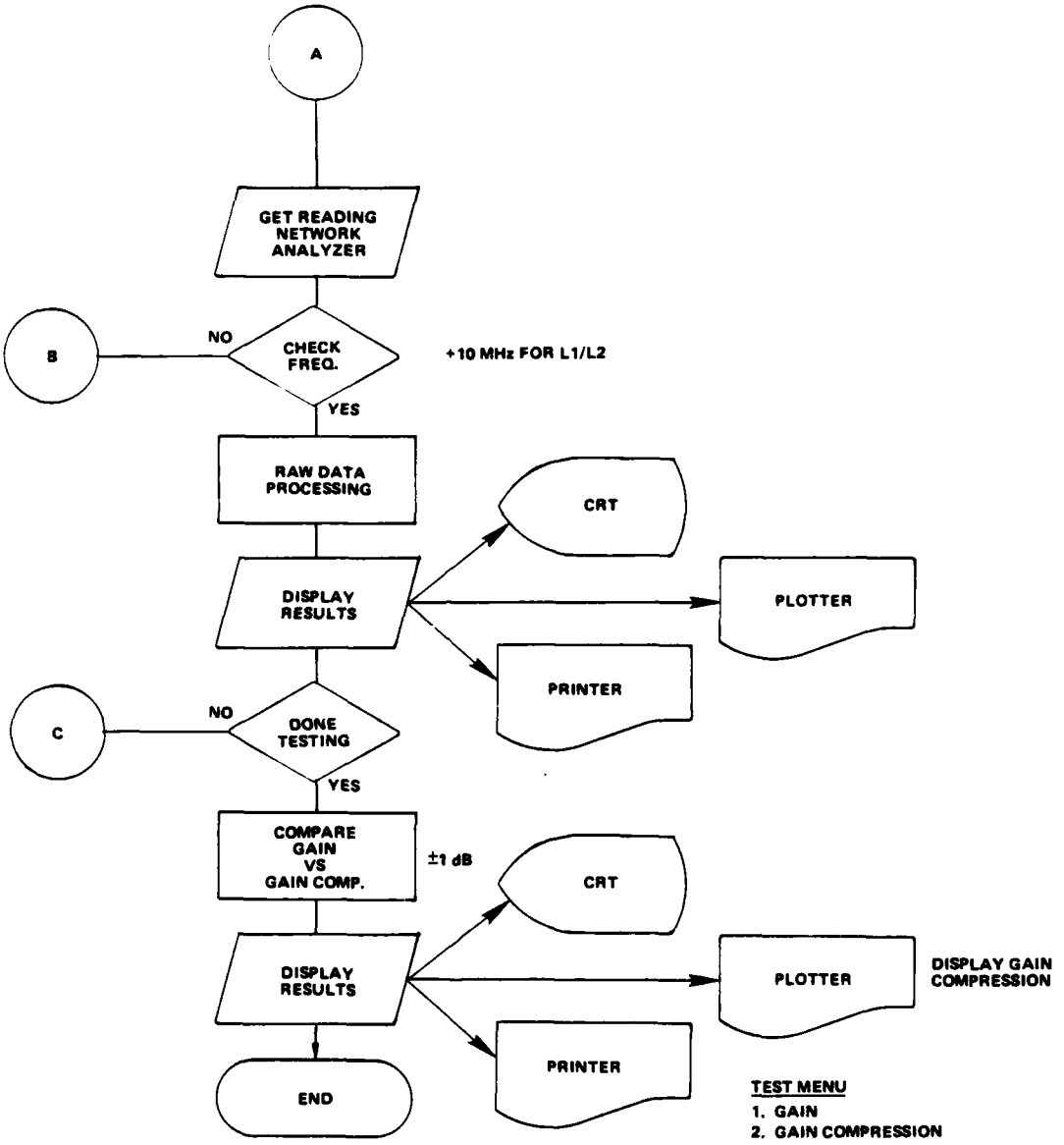



A
RAW DATA PROCESSING
DISPLAY RESULTS
CRT
PLOTTER
PRINTER
B
NO
DONE TESTING
YES
END
TEST MENU
1. INPUT VSWR
2. OUTPUT VSWR

GAIN AND GAIN COMPRESSION

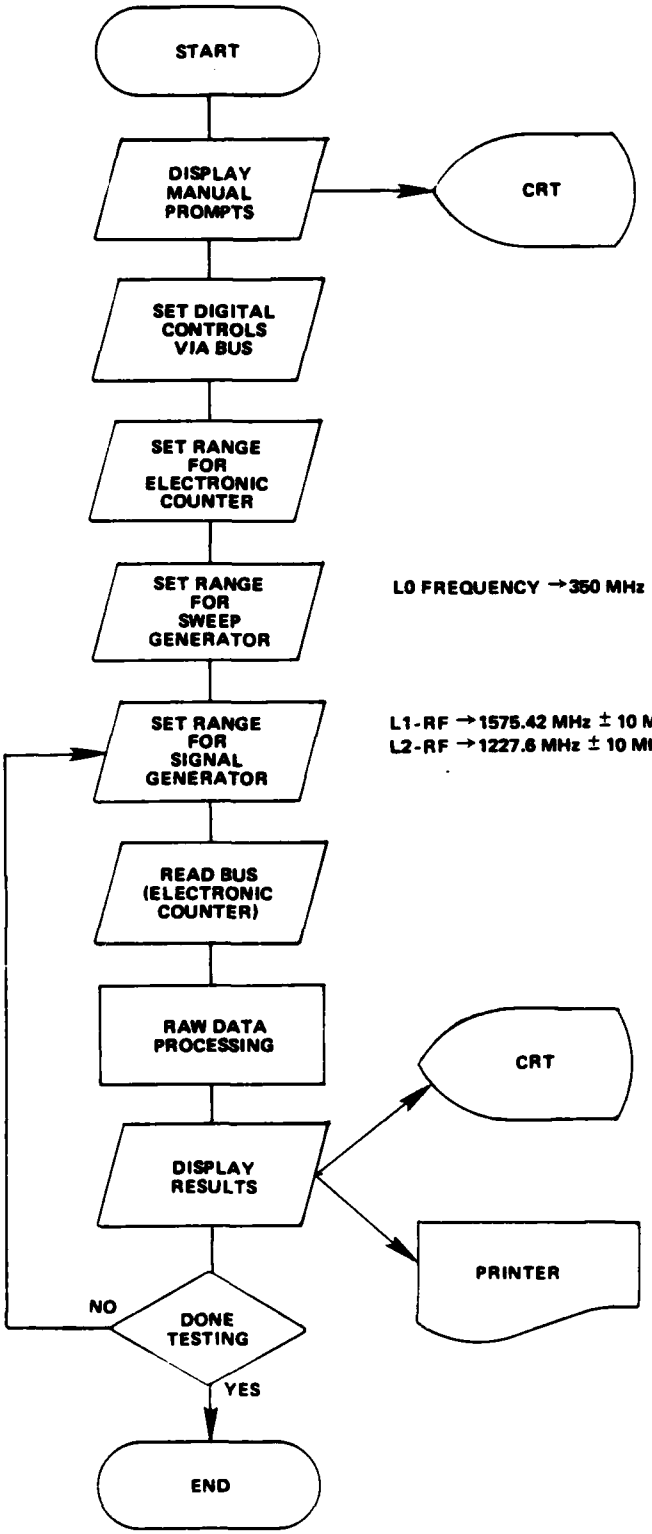
PROGRAM MODULE NAME: _____




A
GET READING NETWORK ANALYZER
B
NO
CHECK FREQ.
+10 MHz FOR L1/L2
YES
RAW DATA PROCESSING
CRT
DISPLAY RESULTS
PLOTTER
PRINTER
C
NO
DONE TESTING
YES
COMPARE GAIN VS GAIN COMP.
±1 dB
CRT
DISPLAY RESULTS
PLOTTER
DISPLAY GAIN COMPRESSION
PRINTER
END
TEST MENU
1. GAIN
2. GAIN COMPRESSION

R. F. FREQUENCY CONVERSION

PROGRAM MODULE NAME: ___ _____



1. POWER ON
2. SET AE MANUAL INPUTS
3. MAKE CONNECTIONS
4. PRESS [RET] WHEN READY.

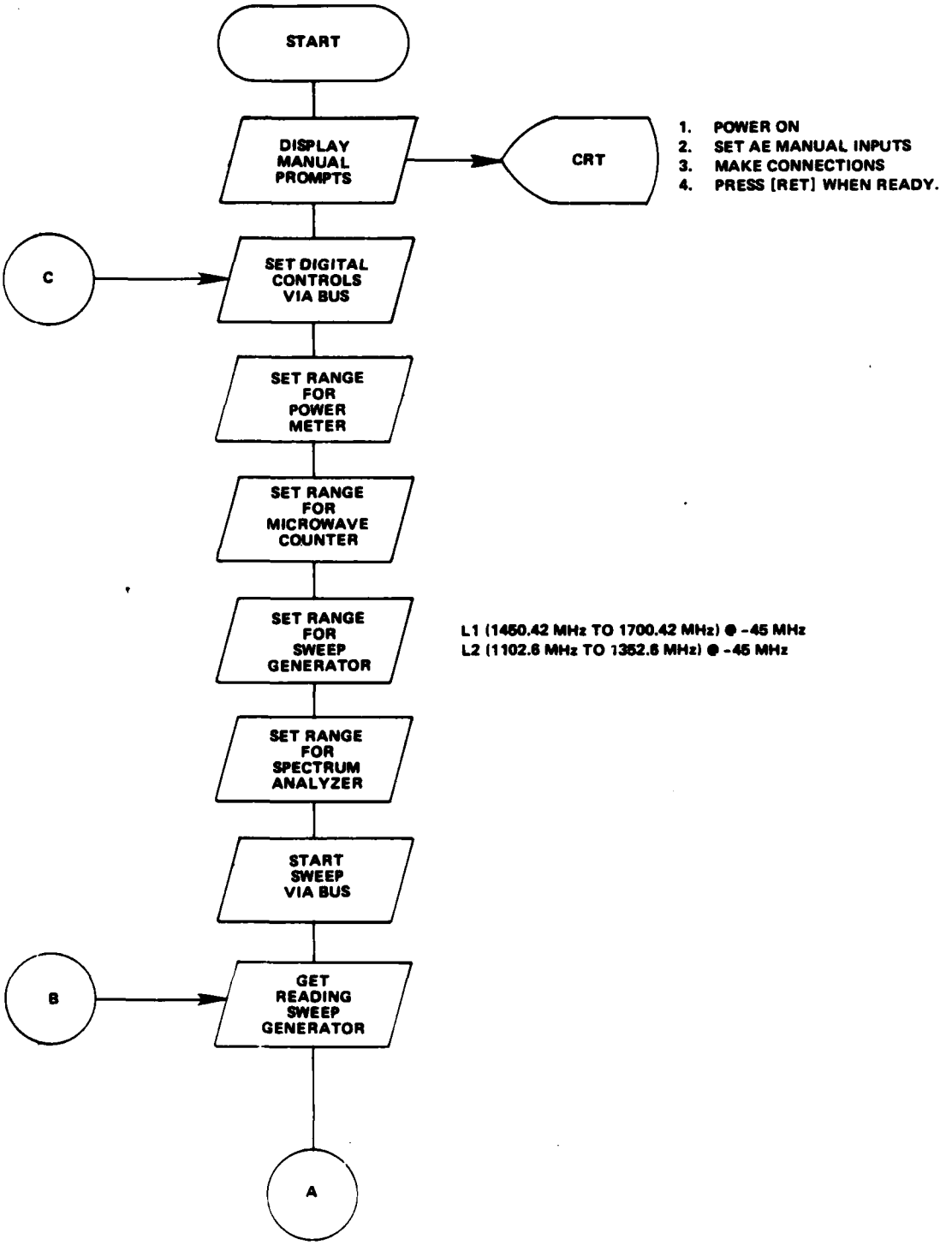
L0 FREQUENCY → 350 MHz

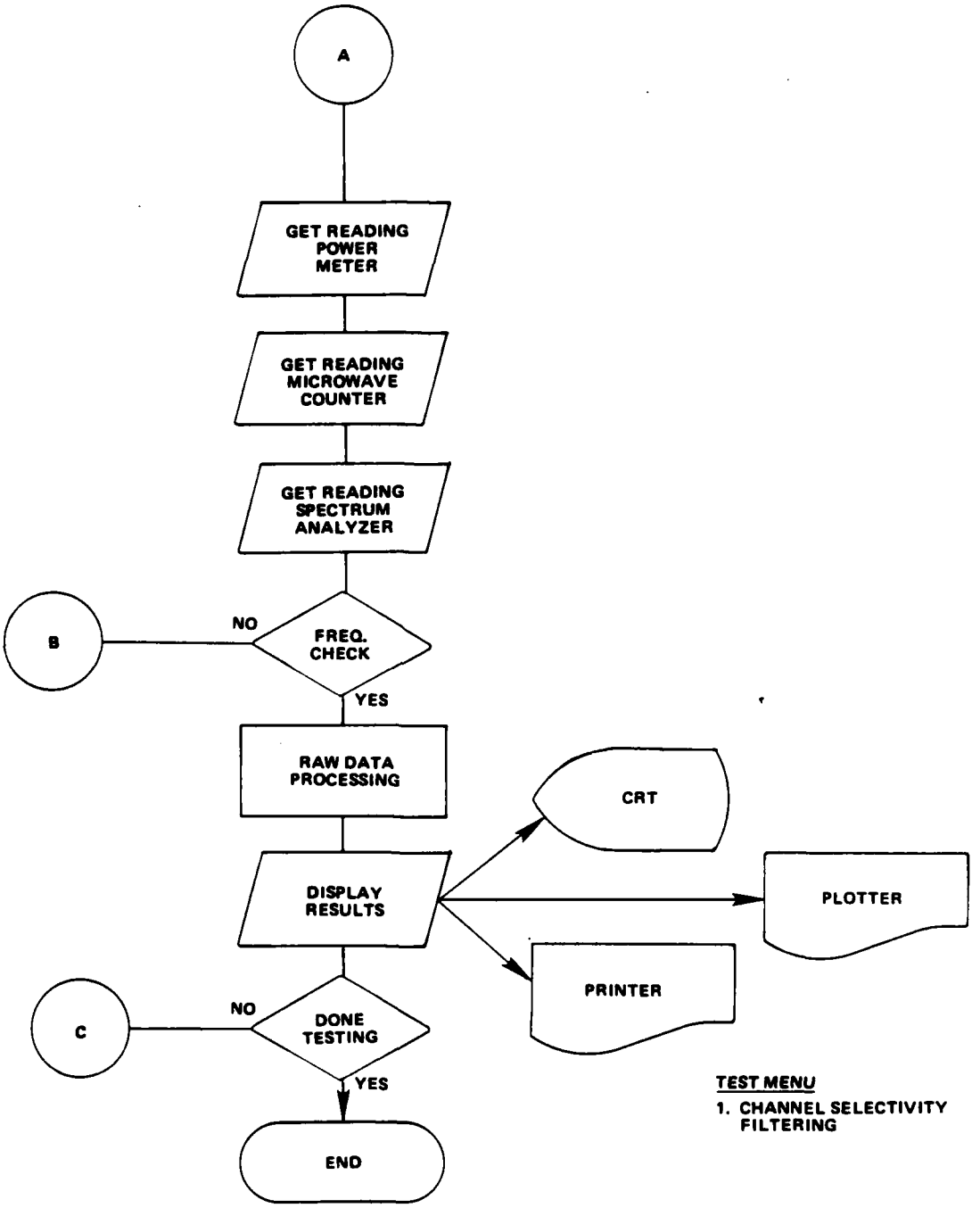
L1-RF → 1575.42 MHz ± 10 MHz
L2-RF → 1227.6 MHz ± 10 MHz

TEST MENU
1. R. F. FREQUENCY CONVERSION

CHANNEL SELECTIVITY FILTERING

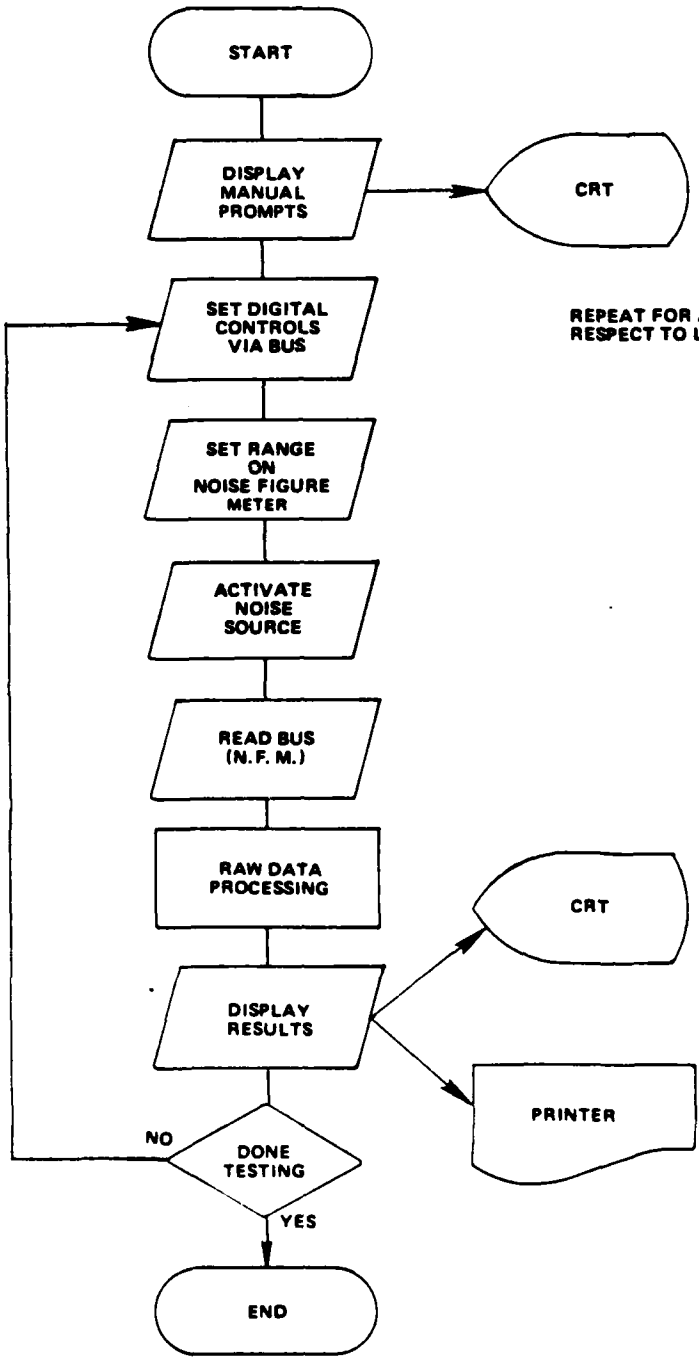
PROGRAM MODULE NAME: _____




A
GET READING POWER METER
GET READING MICROWAVE COUNTER
GET READING SPECTRUM ANALYZER
B
NO
FREQ. CHECK
YES
RAW DATA PROCESSING
CRT
DISPLAY RESULTS
PLOTTER
PRINTER
C
NO
DONE TESTING
YES
END
TEST MENU
1. CHANNEL SELECTIVITY FILTERING

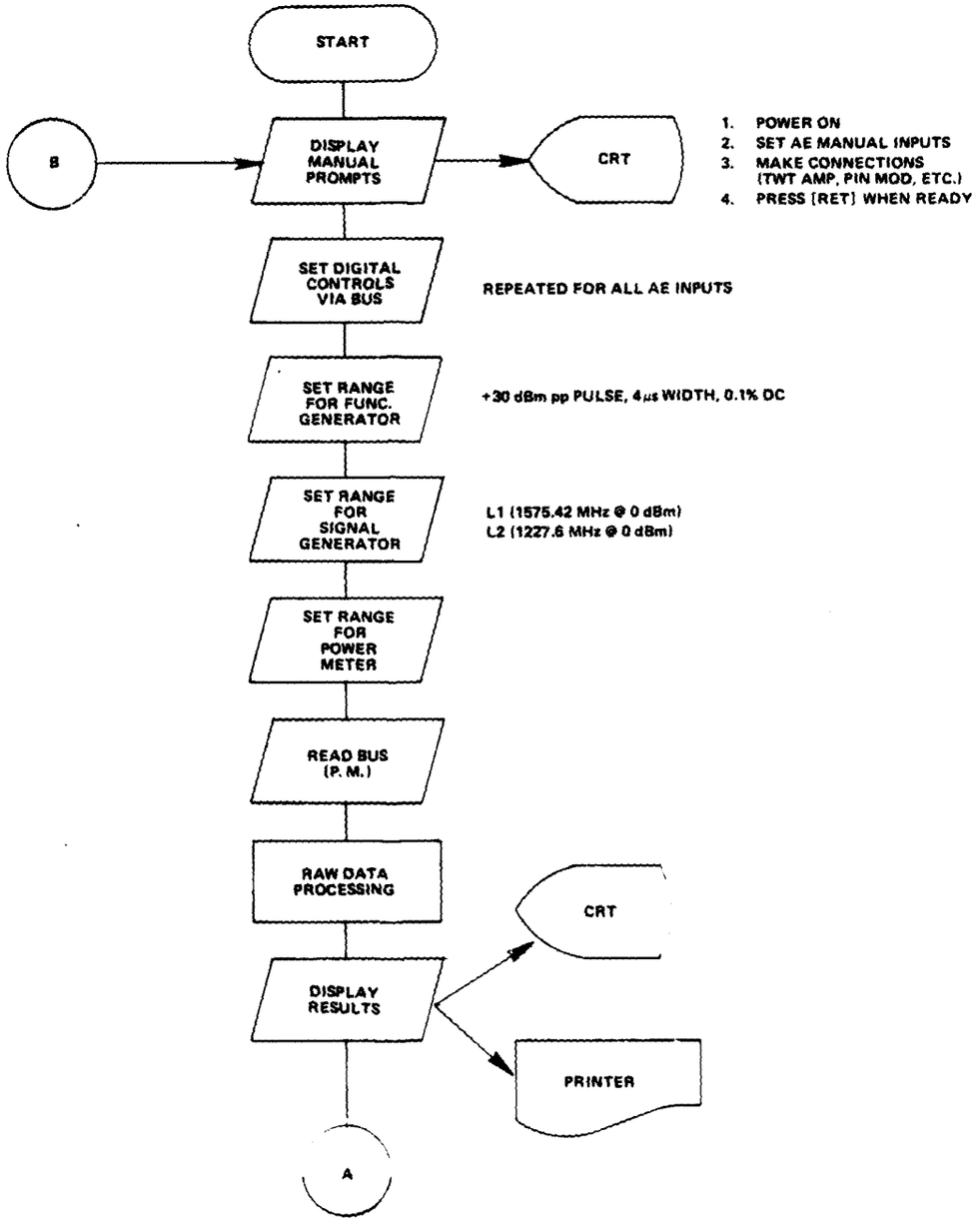
NOISE FIGURES

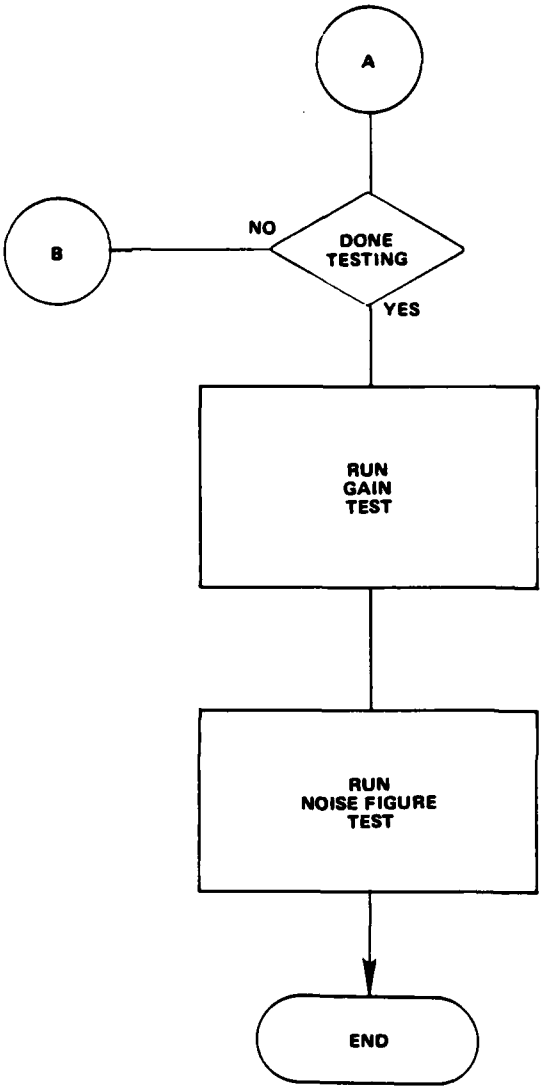
PROGRAM MODULE NAME: _____



NON-DAMAGE INPUT LEVELS

PROGRAM MODULE NAME: _____





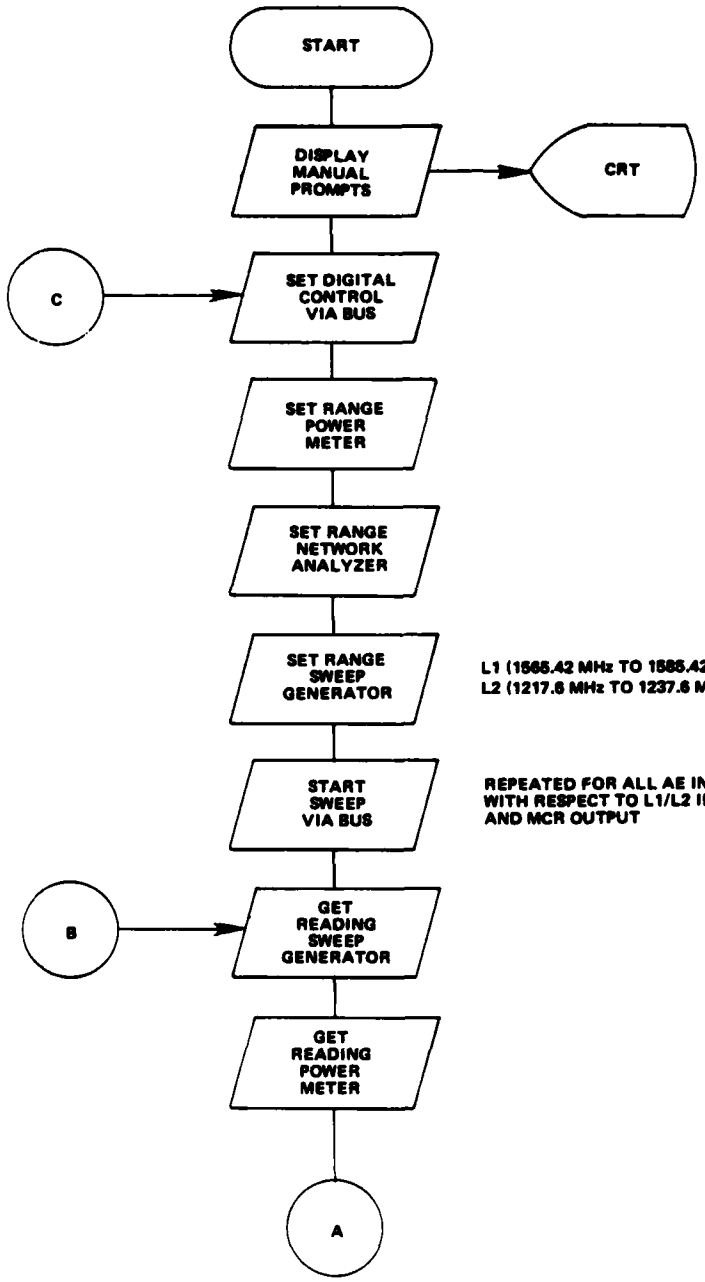
AFTER THE NON-DAMAGE INPUT LEVEL TEST IS COMPLETE THE GAIN TEST AND NOISE FIGURE TEST WILL BE RUN TO VERIFY THAT THE AE DID NOT INCUR PERMANENT DAMAGE.

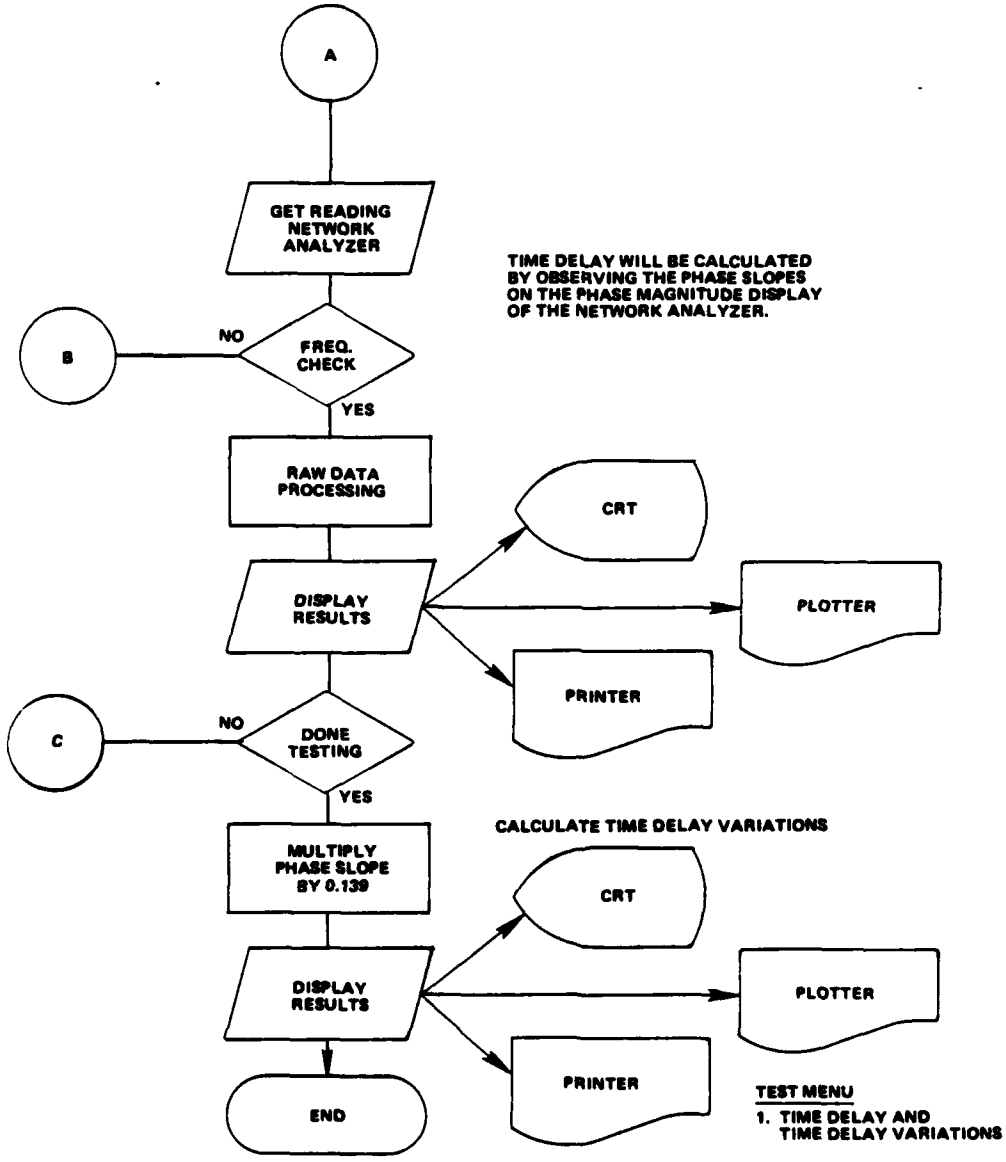
TEST MENU

1. NON-DAMAGE INPUT LEVELS

TIME DELAY AND TIME DELAY VARIATIONS

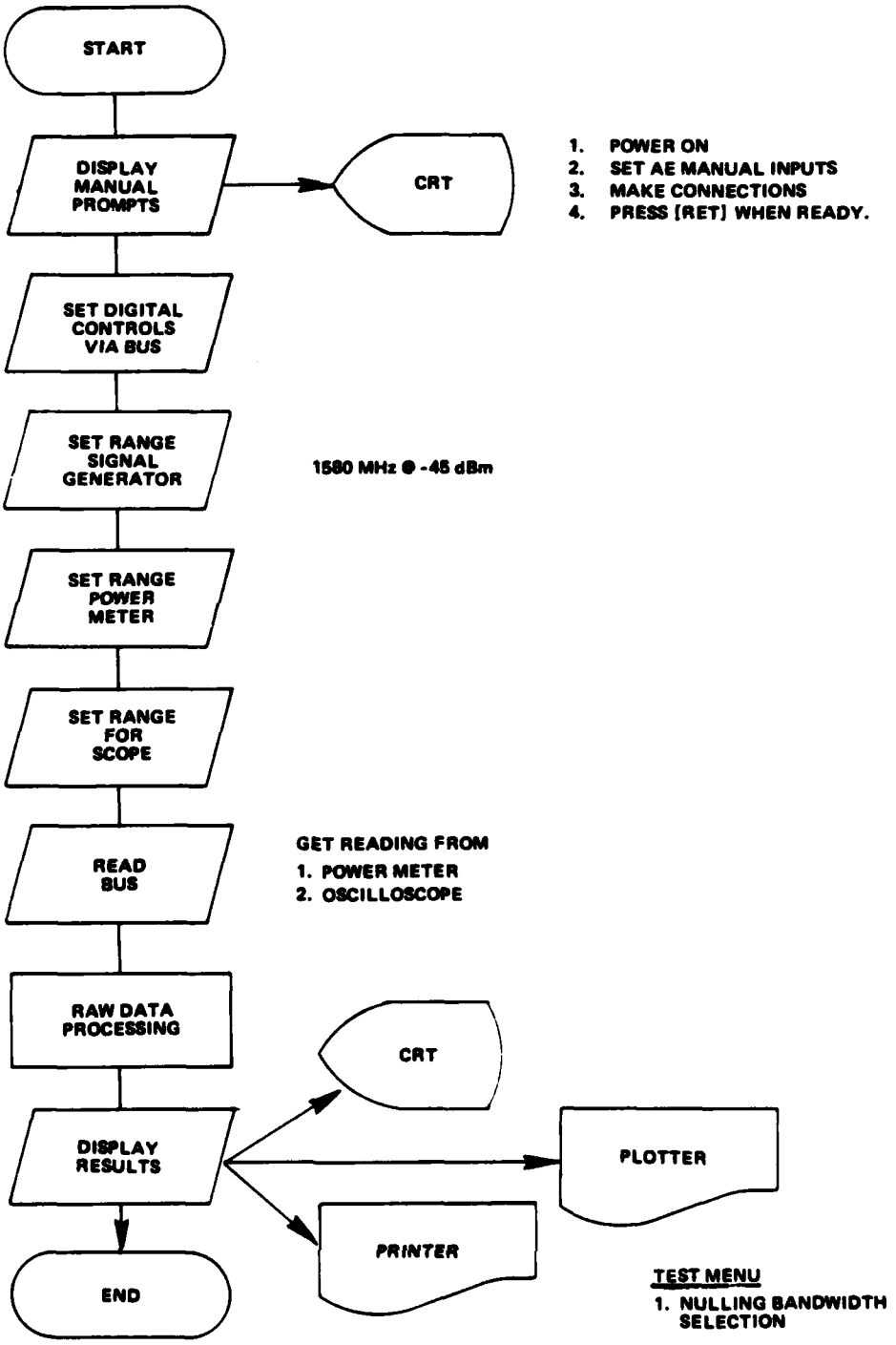
PROGRAM MODULE NAME: _____




A
GET READING NETWORK ANALYZER
TIME DELAY WILL BE CALCULATED BY OBSERVING THE PHASE SLOPES ON THE PHASE MAGNITUDE DISPLAY OF THE NETWORK ANALYZER.
B
NO
FREQ. CHECK
YES
RAW DATA PROCESSING
CRT
DISPLAY RESULTS
PLOTTER
PRINTER
C
NO
DONE TESTING
YES
CALCULATE TIME DELAY VARIATIONS
MULTIPLY PHASE SLOPE BY 0.139
CRT
DISPLAY RESULTS
PLOTTER
PRINTER
END
TEST MENU
1. TIME DELAY AND TIME DELAY VARIATIONS

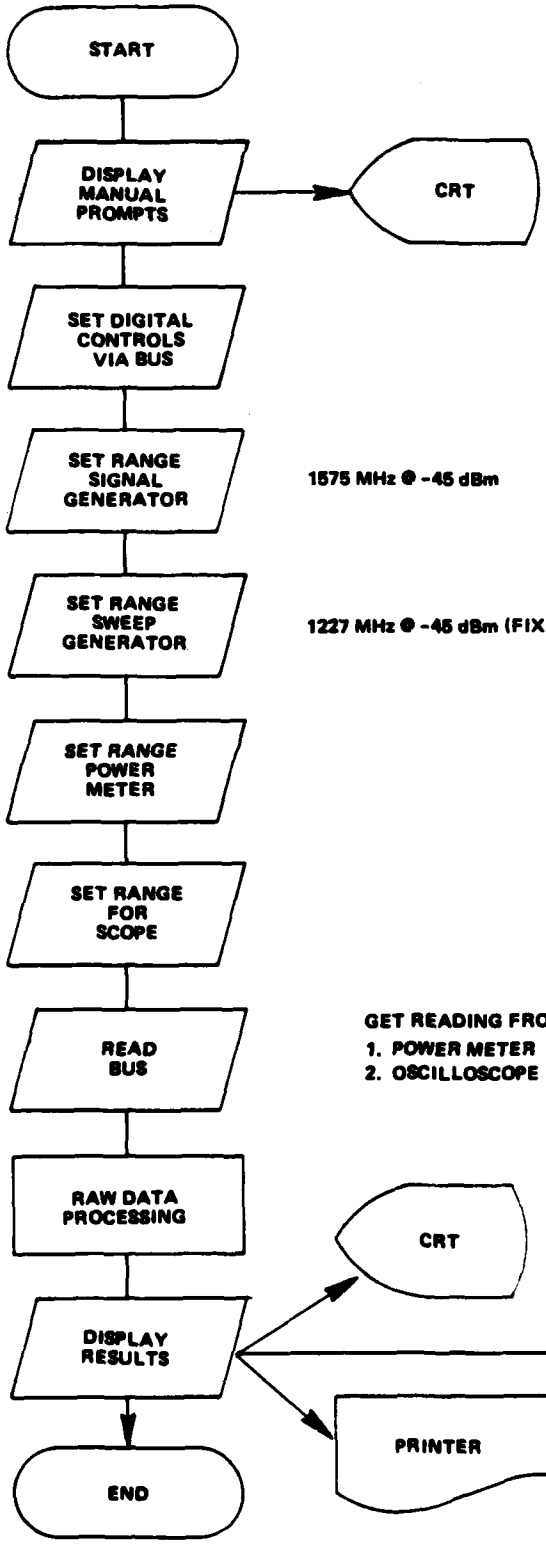
NULLING BANDWIDTH SELECTION

PROGRAM MODULE NAME: _____



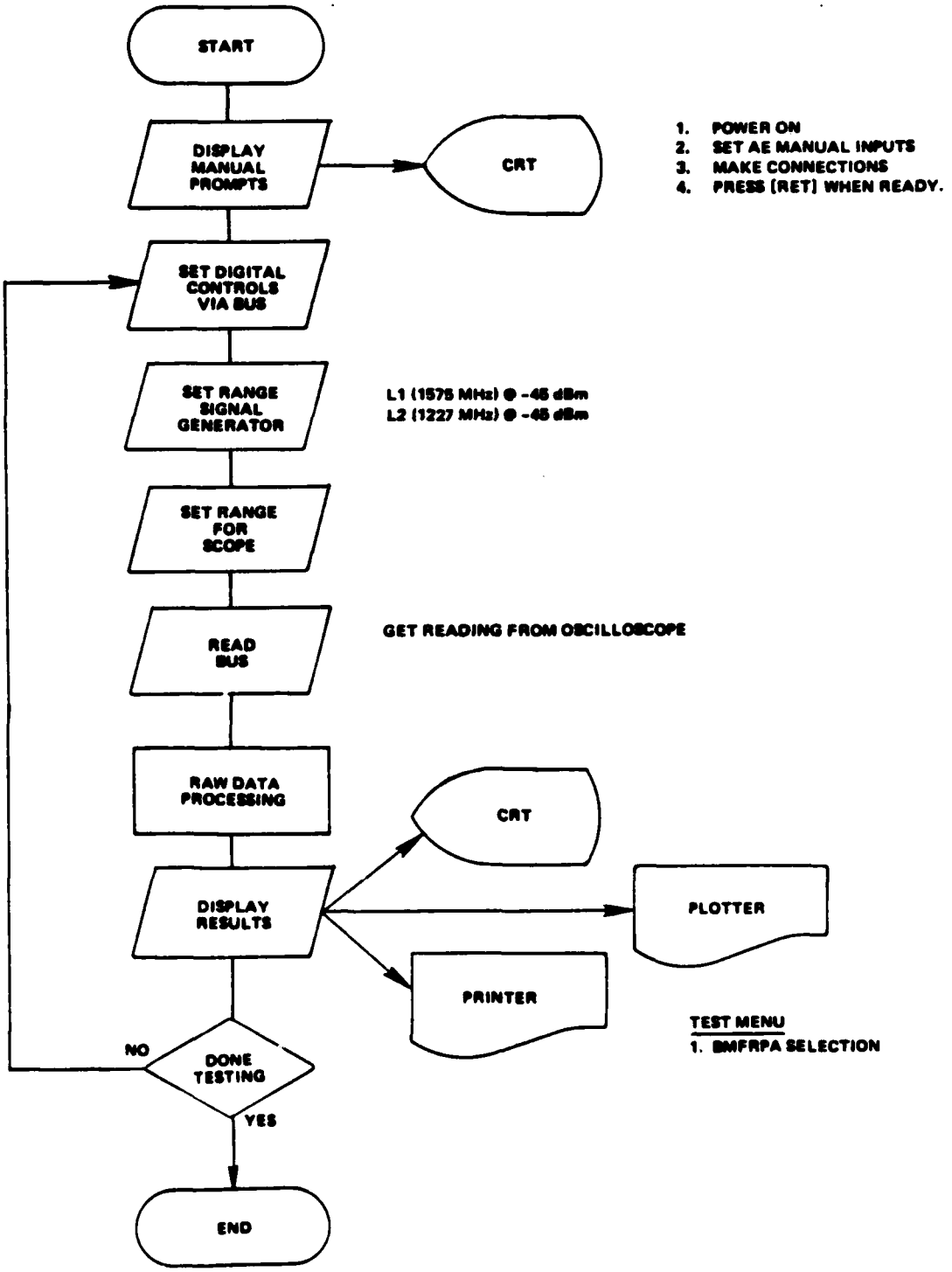
NULLING FREQUENCY SELECTION

PROGRAM MODULE NAME: _____



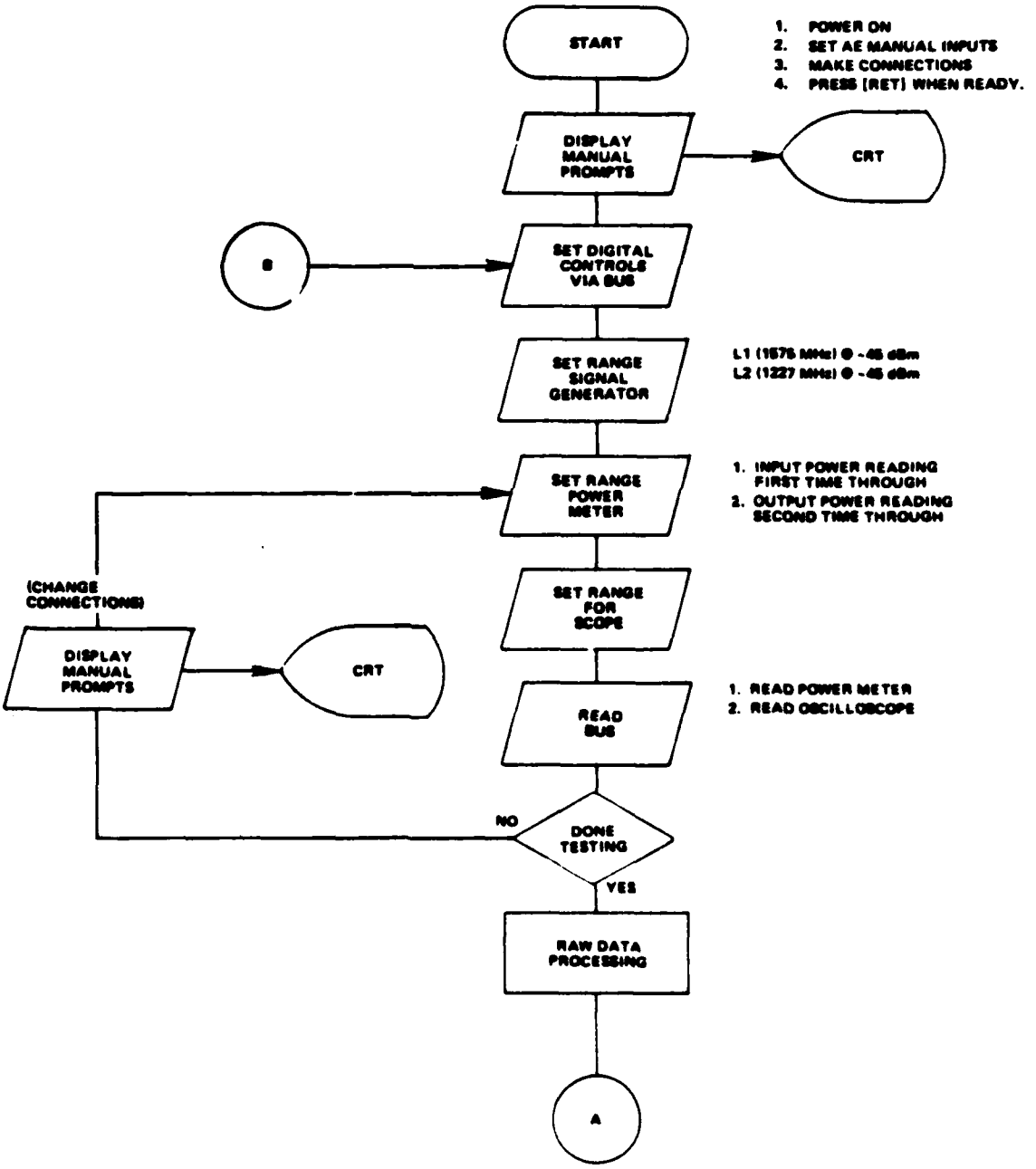
BMFRPA SELECTION

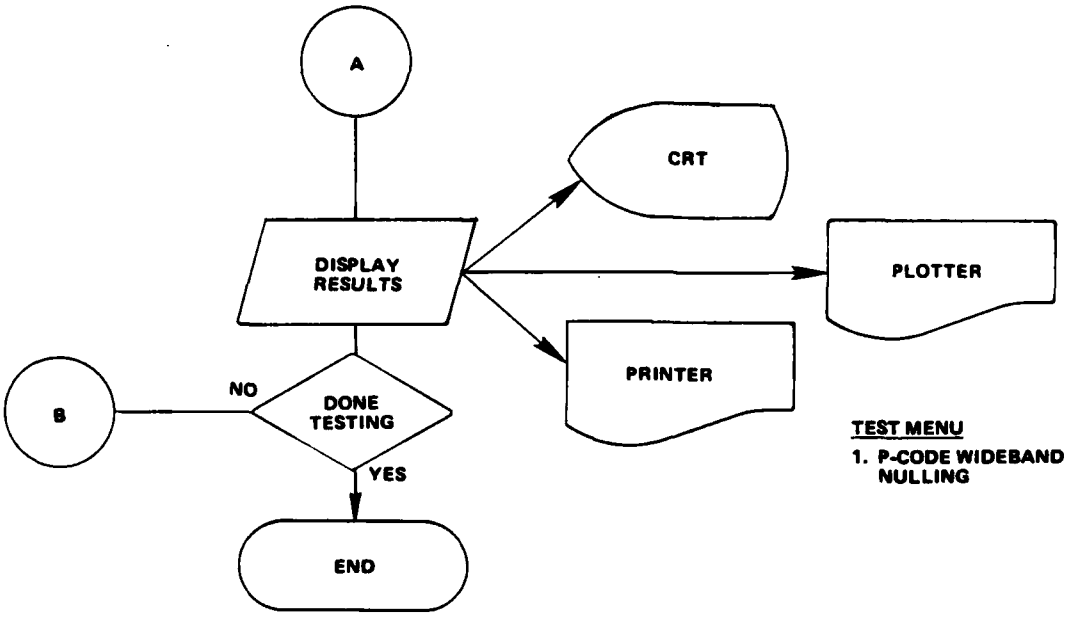
PROGRAM MODULE NAME: _____



P-CODE WIDEBAND NULLING

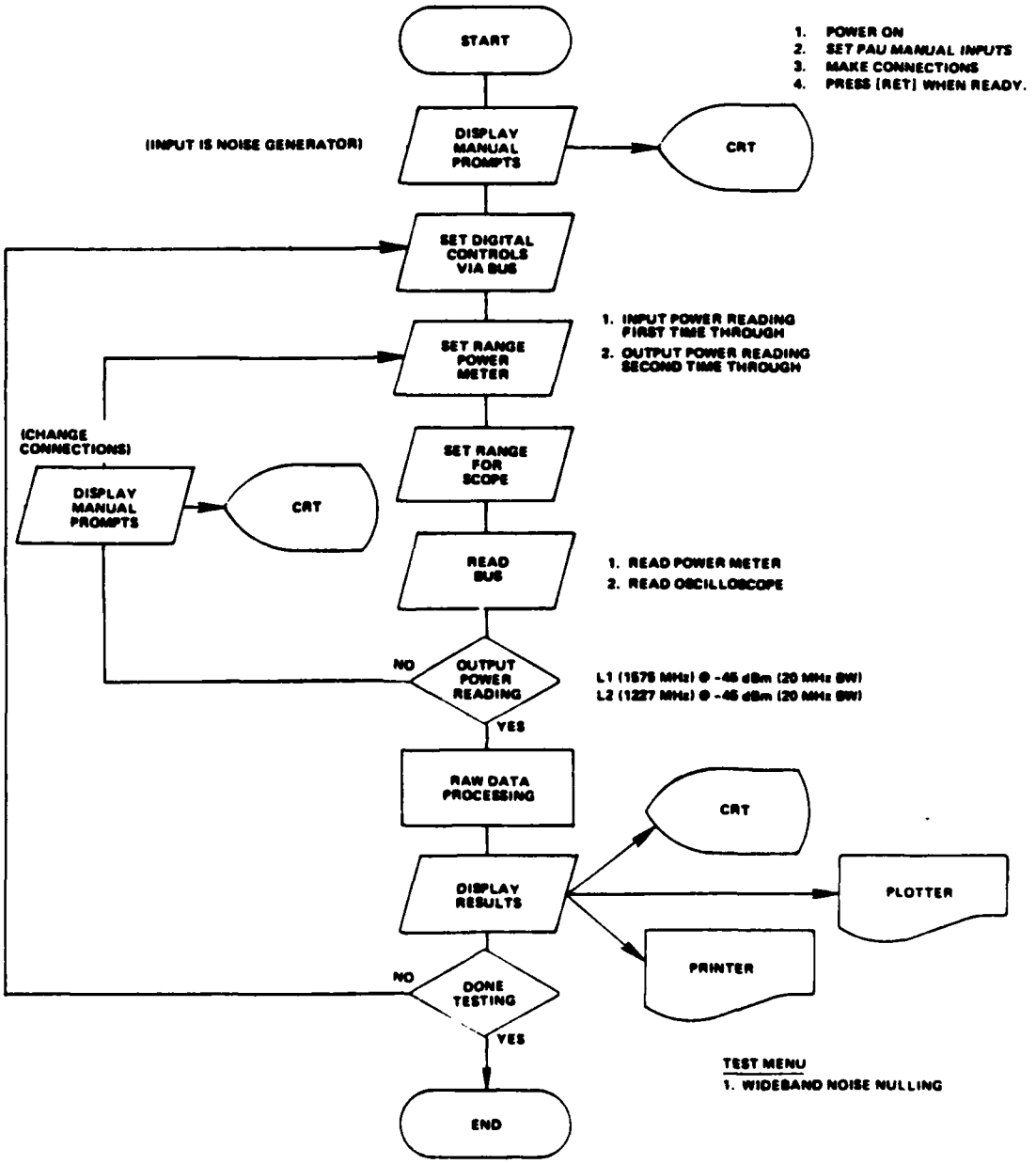
PROGRAM MODULE NAME: _____




A
CRT
DISPLAY RESULTS
PLOTTER
PRINTER
B
NO
DONE TESTING
YES
END
TEST MENU
1. P-CODE WIDEBAND NULLING

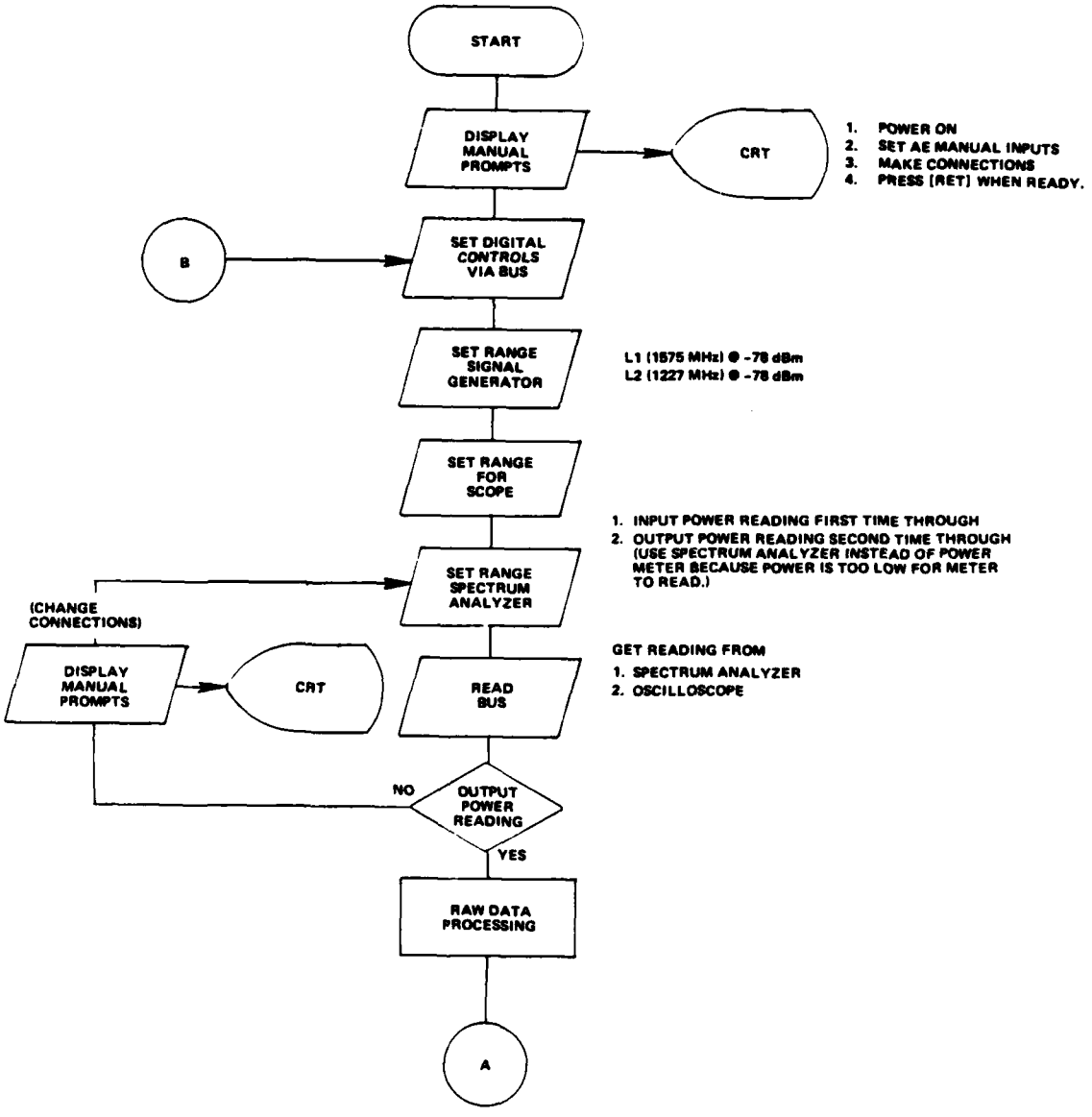
WIDEBAND NOISE NULLING

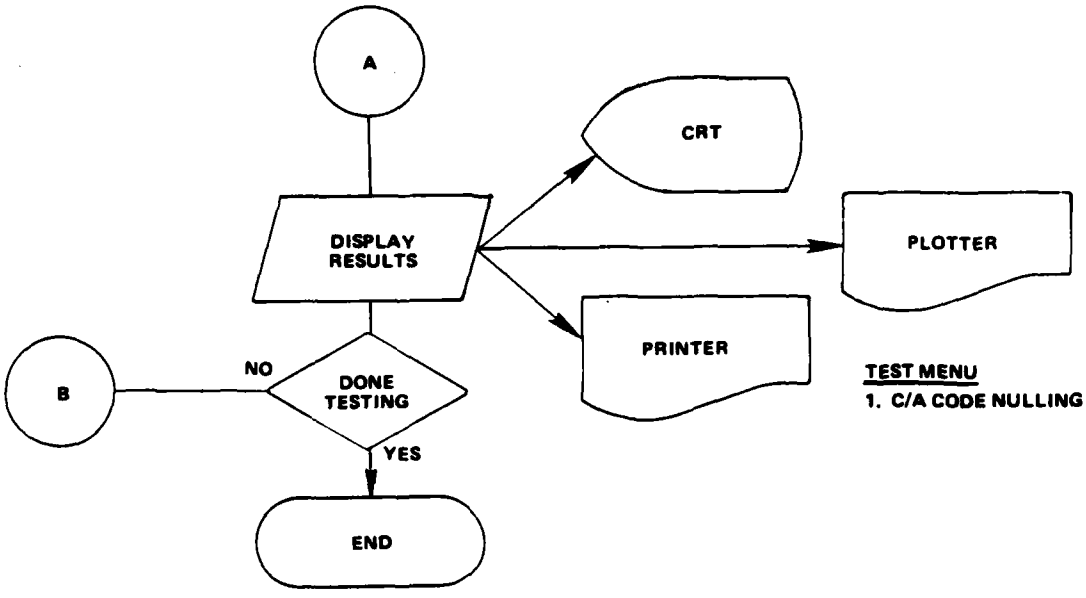
PROGRAM MODULE NAME: _____



C/A CODE NULLING

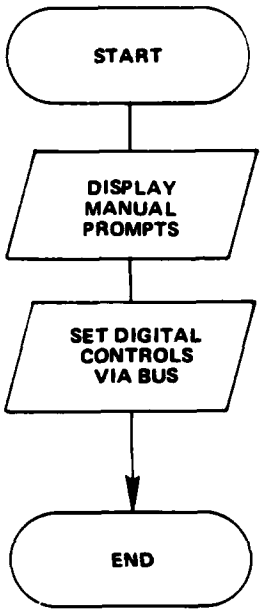
PROGRAM MODULE NAME: _____




A
CRT
DISPLAY RESULTS
PLOTTER
PRINTER
B
NO
DONE TESTING
YES
END
TEST MENU
1. C/A CODE NULLING

BIT DURATION

PROGRAM MODULE NAME: _____



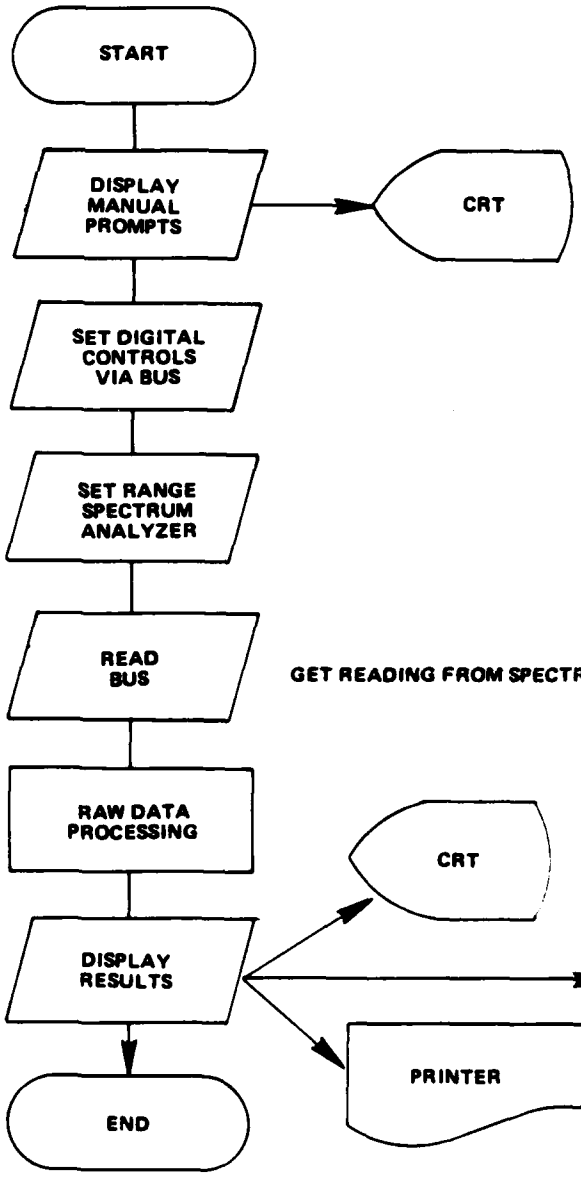
1. POWER ON
2. SET AE MANUAL INPUTS
3. MAKE CONNECTIONS
4. PRESS [RET] WHEN READY

TEST MENU

1. BIT DURATION

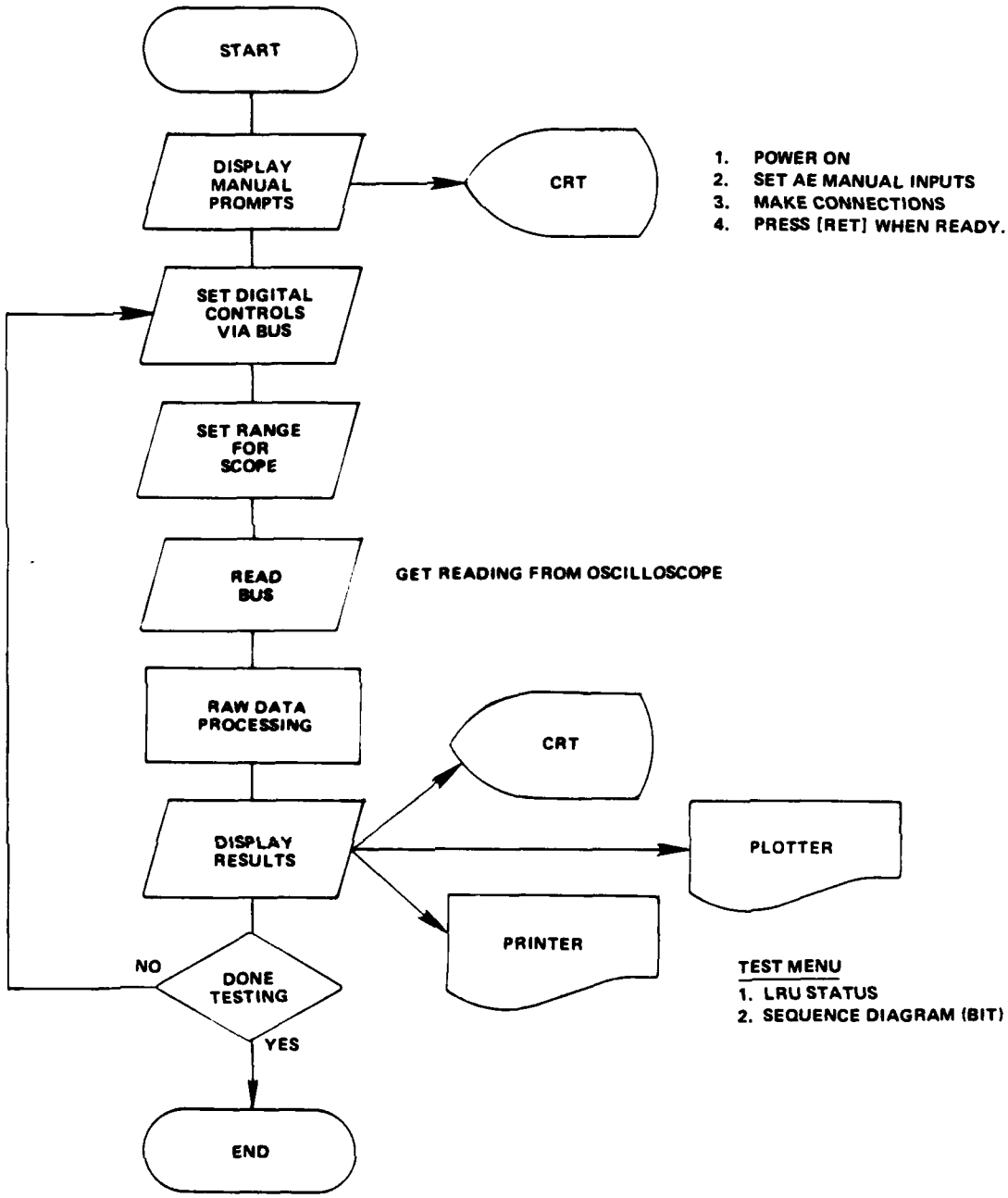
CONTINUITY CHECK

PROGRAM MODULE NAME: _____



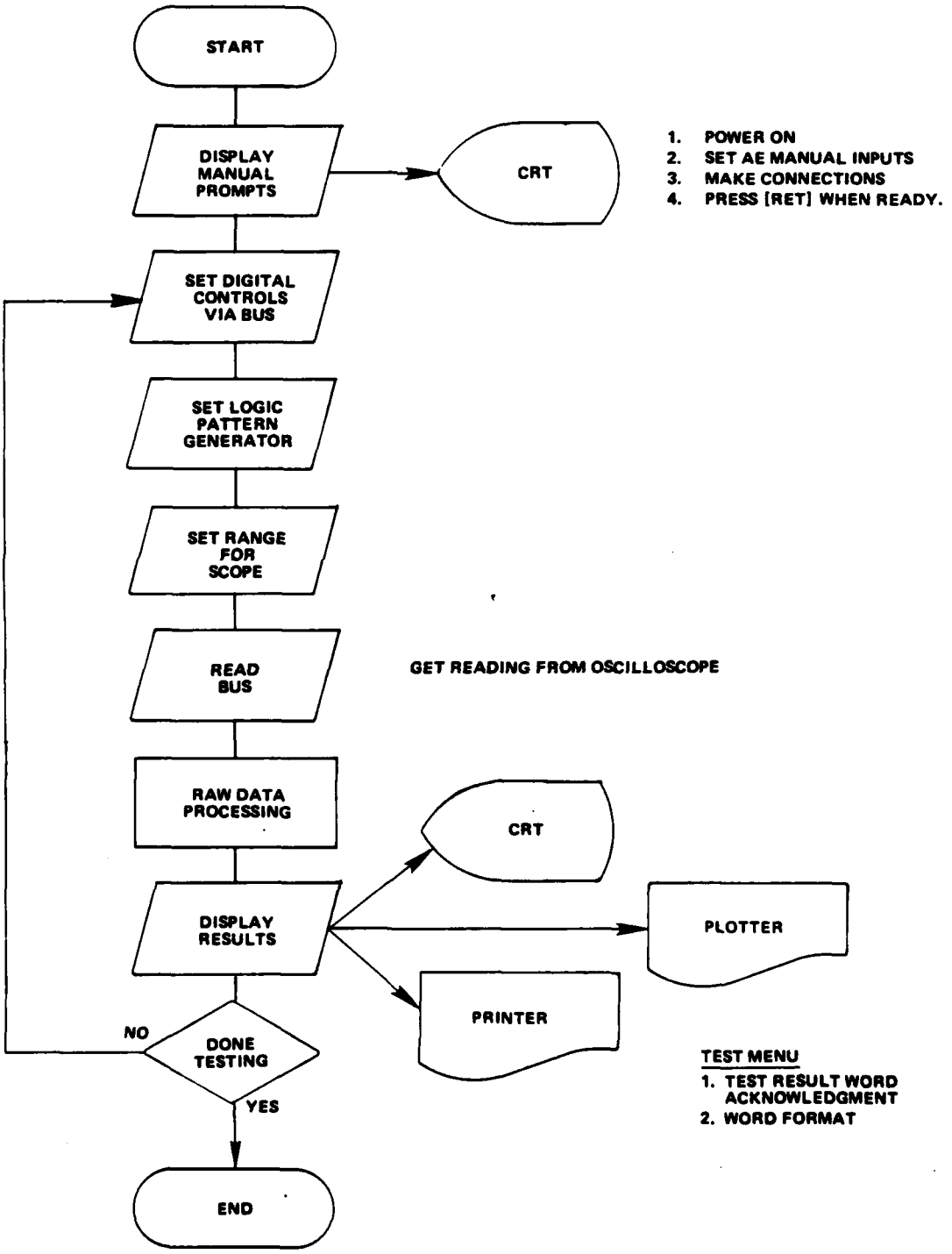
LRU STATUS AND SEQUENCE DIAGRAM (BIT)

PROGRAM MODULE NAME: _____



TEST RESULT WORD ACKNOWLEDGMENT AND WORD FORMAT

PROGRAM MODULE NAME: _____



END

DTIC

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